Innovative Technology

POWERING TRANSACTIONS AND INTERACTIONS

BV50 User Manual

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Change History

Version	Date	Comment
1	07 May 2025	Initial Release

Uncontrolled Document Once Exported.
Please visit the Support Hub for the latest Information.

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BV50 Product Introduction

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General Description

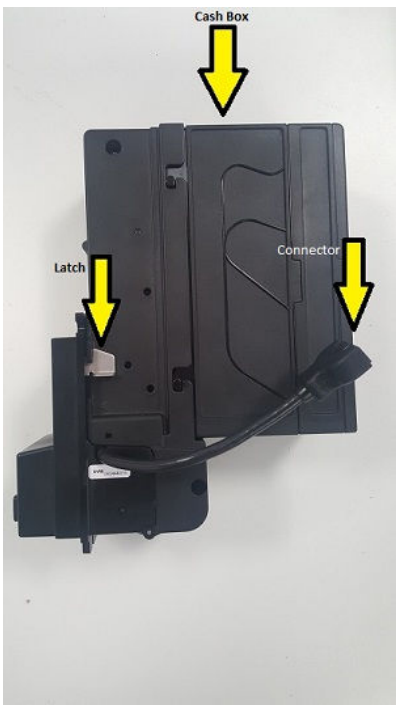
The BV50 bill acceptor is designed specifically for USD bills / EUR notes with its fixed bezel width. With the option of up or down stacking and four cash box capacities (300, 550, 800 or 1050) the BV50 is ideal for amusement and vending machine applications. The BV50 is exceptional value with a fast repayment of your initial investment, while easy maintenance and free firmware updates made the unit future proof.

- Designed specifically for USD bills / EUR notes.
- Cashbox options to suit all applications
- Quick transactions
- Ideal for amusement and vending applications

Typical Applications

- Gaming
- Amusement
- Vending

Component Overview

Configuration Button	Mounting Points	Cash Box
		

Bezel Options

ITL Part Number	Description
PA02877	BV50 Mounting Plate Assembly 

Cashbox Options

Some national currencies differ in thickness and circulation practices. Depending on usage, this can impact cash box capacities by 10-15%. Consult with your ITL representative for more details.

Part Number	Image	Description
PA00814		BV50 300 Note Cashbox
PA00822		BV50 550 Note Cashbox

Part Number	Image	Description
PA00823		BV50 800 Note Cashbox
PA00821		BV50 1050 Note Cashbox

BV50 Technical Data

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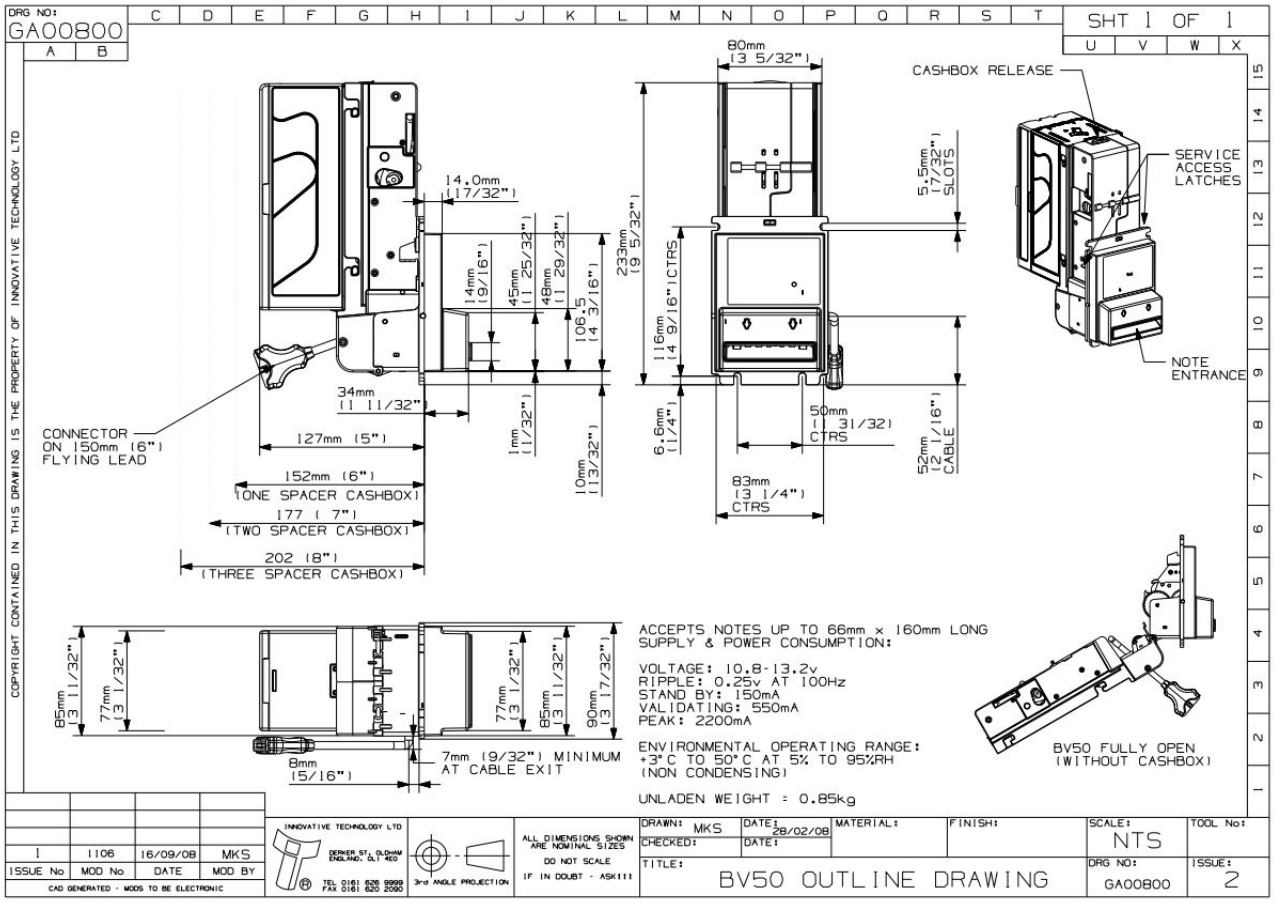
Dimensions

The dimensions below are for the BV50 showing 300, 550, 800 and 1050 note cashbox. For dimensional drawings contact support@innovative-technology.com



Weight

Unit	Weight
BV50	0.85kg

Environmental Requirements

Environment	Minimum	Maximum
Temperature	+3°C	+50°C
Humidity	5%	95% Non-Condensing

Power Requirements

Supply Voltages

Supply Voltage	Minimum	Nominal	Maximum
V DC	+10.8V	12V	13.2V
Supply Ripple	0V	0V	0.25V @100Hz

Supply Current

	Nominal	Maximum
Peak	2.5A	3A
Running	1A	1.5A
Standby	0.2A	0.4A

Power Supply Guidance

The BV50 requires a stable 12V DC / 3.0A power supply.
TDK Lambda manufactures suitable power supplies. Please see table below for further details.

Power Supply Unit	Specification	RS Stock Code	Farnell Stock Code
TDK Lambda RWS50B-12	+12 V DC / 4.3 A	839-9626	2452725

Check the power requirements of the host machine and other peripherals to dimension a suitable power environment for the machine setup.

110V AC Interface

The BV50 can also be supplied with a 110v AC to 12V DC adapter which can be mounted to the rear of the unit.

Interface Logic Levels

	Logic Low	Logic High
Inputs	0v to +0.5v	+3.7v to +12v
Outputs with 2K2Ω pull-up resistor	+0.6v	Pull-up voltage of host interface
Maximum Current Sink	50mA per Output	

Reliability Data

Below is an explanation outlining the Mean Cycles Between Failure (MCBF) & Mean Cycles Between Interruption (MCBI) for the BV50. Where a cycle is defined as a note accepted or rejected.

The difference between MCBF and MCBI is that a failure is classed as an event which will require a service call – e.g. unit is seeing poor acceptance. Whereas an interruption is an event which store/site staff could rectify without a trained engineer present – e.g. clearing a jam.

The MCBF of the BV50 is 100,000.

Media Requirements

The BV50 is capable of handling multiple denominations simultaneously, the media that can be accepted includes but is not limited to:

- Polymer and windowed notes

Compatible media is as follows:

USD Bills	EUR Notes
1	5
2	10
5	
10	
20	
50	
100	

BV50 Mechanical Installation

Contents

Compatibility

Hardware Compatibility

Machine Mounting

The BV50 has been designed to retrofit into standard amusement fascias with the mounting kit, as such it is a drop-in replacement for many amusement style bill validators. Innovative Technology Ltd. has a policy of continuous product improvement. Due to design changes older model or product bezels (and cashboxes) may not be compatible with the BV50. However, new product deliveries always include a bezel and cashbox that must be used. Innovative Technology Ltd. has a policy of continuous product improvement. Due to design changes older model or product bezels (and cashboxes) may not be compatible with the BV50. However, new product deliveries always include a bezel (and cashbox) that must be used.

Only use the bezel and cashbox delivered with the product

Machine Interfacing

The BV50 has a 16-pin connector which has the same pin-configurations as many of ITL validators. The optional 110v interface connects directly into the 9-pin Molex connector traditionally found in amusement style machines.

Power Supply

It is vital that the BV50 is connected to a power supply being able to provide the required power environment. A weak power supply causes malfunctioning of the BV50 such like note rejects or missing credits. If the BV50 is used as a fitting replacement for an older model or product we recommend checking the power supply specifications of the machine. The power supply of the machine might be designed for the older model or product but not suitable for the BV50. The BV50 might have higher power consumption. Refer to the Power Requirements section for full power details of the BV50.

Software Compatibility

Interface Protocols

When using the BV50 as a fitting replacement for an older model or product some events such like credits may be given earlier. This is due to improved firmware routines and faster motors being used. This may cause missing events such like credits in those host machines where timeouts are defined for the older model or product. Please contact the machine manufacturer for full compatibility of the BV50.

Timing issues may cause missing events - for example missing credits.

Re-programming

For re-programming the BV50 always use the latest version of Validator Manager available for download on our website. Older versions may not fully support the product. All software from Innovative Technology Ltd is free of charge and can be downloaded from the website: www.innovative-technology.com/support/securedownload once registered and logged in. If you are not registered, please create an account via the Create an account form. A confirmation email will be sent to the registered email address once all contact details have been successfully submitted. As of June 2016 the ASIIC chip used in the BV50 was made obsolete by the manufacturer. As such a new board revision with a different processor was released. This resulted in a different hardware revision and firmware version, please see below:

The BV50 with the ST chipset will be referenced in the dataset name (see below in RED):

Old Style- USD02316_BV50
New Style- USD02L17_BV50

Older versions of Validator Manager may not support the BV50!

Cashbox Mounting

Cashbox Fitting

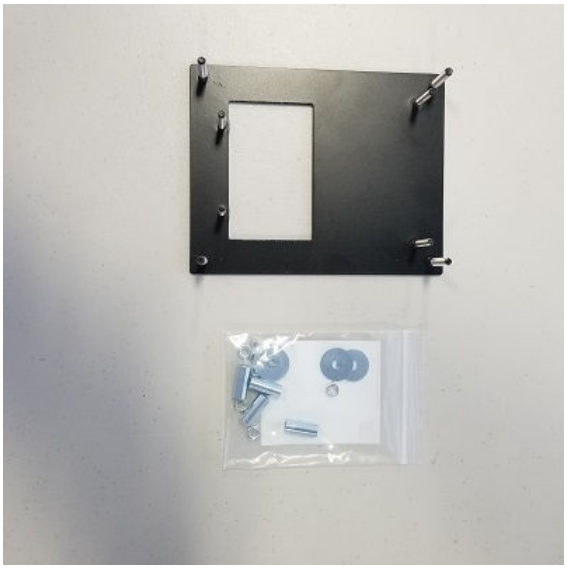
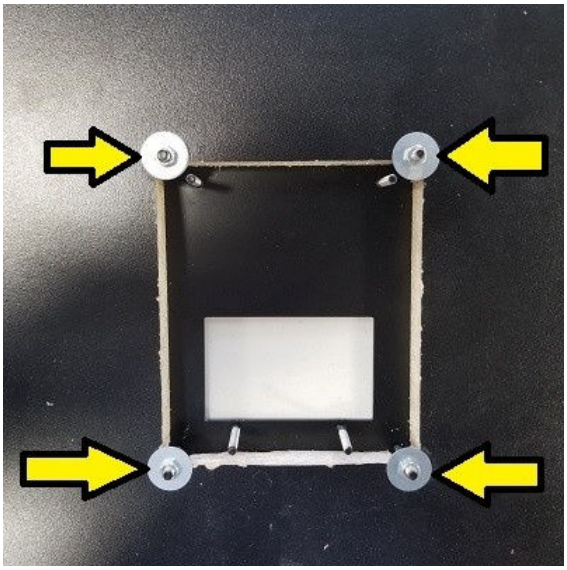
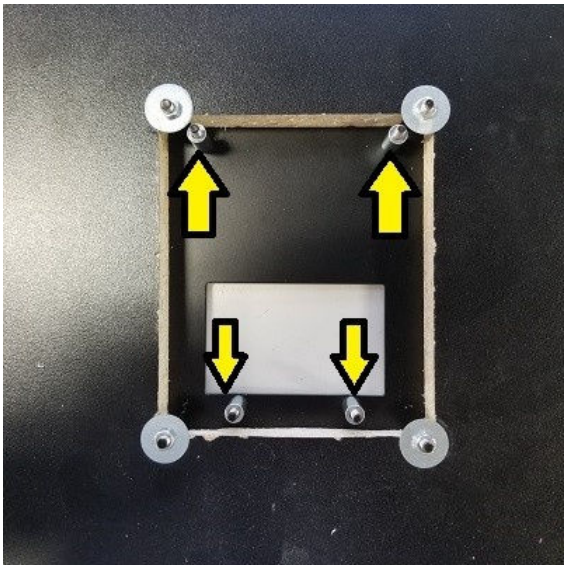
Description	Image
Line the cashbox up, there are mounting slots on the sides of the BV50 that the cashbox slides into.	

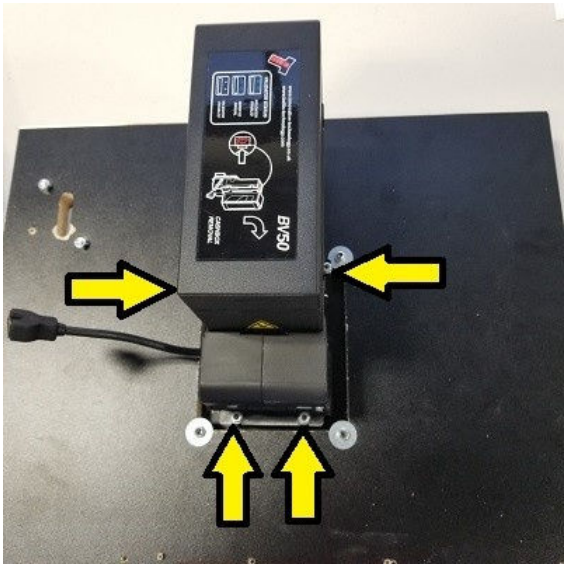
Description	Image
Clip in place, slide the cashbox down until the red clip on top is clipped into place.	

Cashbox Removal

Description	Image
Slide clip up, to remove the cashbox, slide the red clip upward.	
Remove cashbox with the red clip up, slide the cash box upward, and pull outward.	

Machine Mounting

Description	Images
Mounting Plate Un-package your mounting plate and make sure you have the hardware kit with the mounting plate. Included in the kit: 4xLarge washer, 4x small washer, 4x spacer, 4x 7mm washer, 4x 8mm washer, and accepted currency sticker.	
Mounting Plate to the Door Slide the mounting plate flush to the door. Place the four large washers over the outer bolts and use the four 8mm washers to secure the mounting plate.	
Spacers Remove the four spacers from the bag and place them over the four inner bolts as shown.	

Description	Images
BV Mounting to Plate With the BV mounted in place, flip the door over and apply the correct currency sticker to the plate. This will inform customers of the currencies and denominations the machine accepts. Be careful not to over tighten the nuts as the bezel can crack.	
Currency Stickers With the BV mounted in place, flip the door over and apply the correct currency sticker to the plate. This will inform customers of the currencies and denominations the machine accepts.	

BV50 Software Installation & Configuration

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Software Downloads

The BV50 leaves the factory programmed with the latest dataset and firmware files, unless specifically requested. However, it is important to ensure your device is kept up to date with the latest dataset and firmware.
All software from Innovative Technology Ltd is free of charge and can be downloaded from the Support Hub once registered and logged in.

Drivers

The ITL drivers allow you to connect any of our validators to a compatible Windows device. If you are connecting via an IF17, you will not need to follow this process as they are signed Microsoft Drivers and should install automatically. If this isn't the case or your computer is disconnected from the network, there is a standalone package included within the driver downloads.

Dataset/Firmware Programming

Validator Manager

General Description

Validator Manager is a utility which allows the user to reprogram any of ITL's validators and hoppers as well as coin and note recyclers. Note that admin rights are required during installation. The validator must be in SSP for the Validator Manager to detect the device.

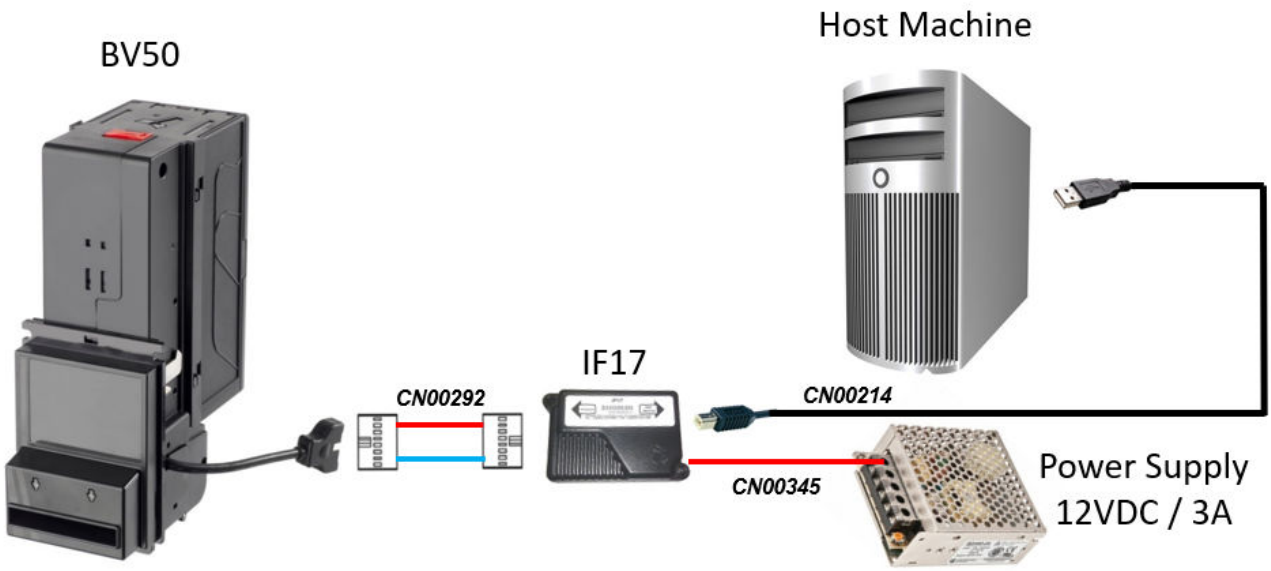
System Requirements

- .Net Framework 4.5 and above
- Windows 8.1 and above
- 256mb ram
- 50mb hard disk free

We have seen instances where one of the dll's (itdata1.dll) used in Validator Manager are flagged as a Trojan, this is a false positive and if this happens you will need to add a rule to your antivirus to allow the file to run.

Hardware Setup

The connection example below shows a connection between the BV50 and the host machine (PC) using an IF17 interface. This also applies to the DA2 programming kit.



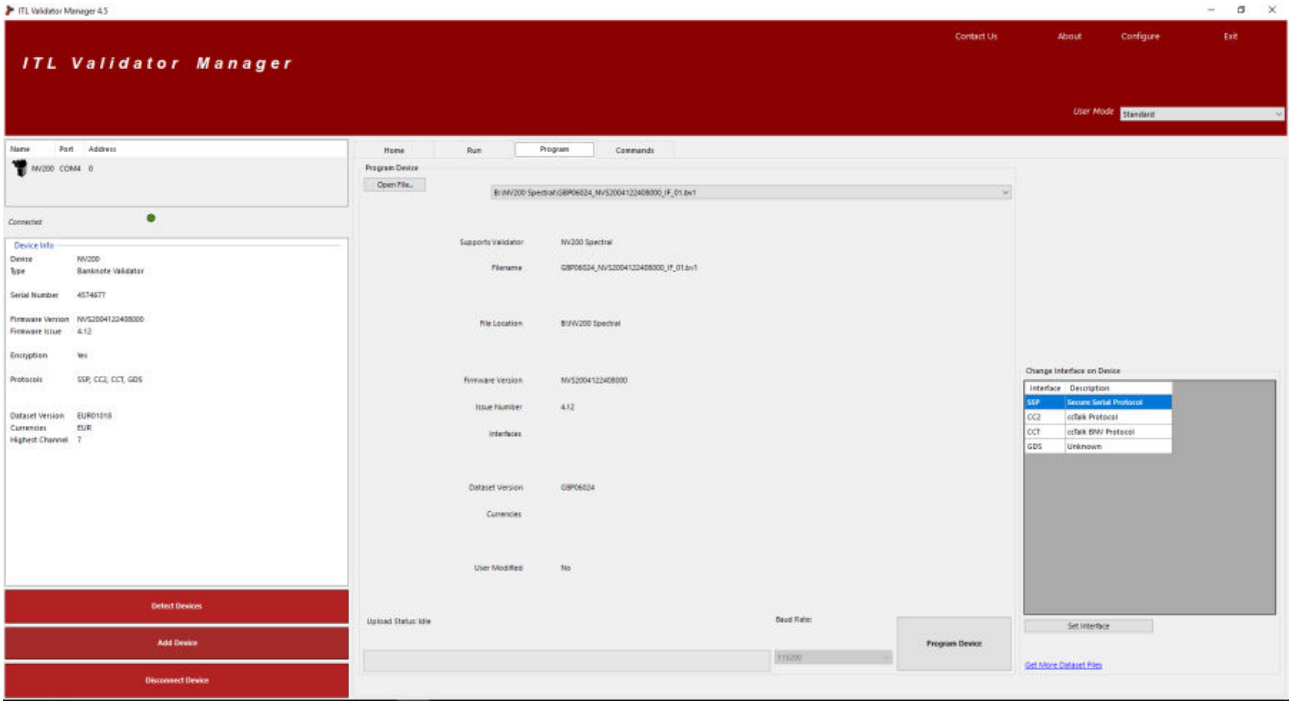
ITL Part Number	Description
CN00292	SSP Cable
CN00345	IF17 Power Cable
CN00214	USB A to B
IF17	TTL to USB Converter

Switching to Programming Mode (SSP)

Before programming via Validator Manager, the BV50 needs to be switched to its programming mode (SSP interface). Refer to Switching to Programming Mode (SSP) for the procedure for doing this.

Programming the Device

Once you have switched the unit into SSP, open Validator Manager and click detect devices. This will scan all active com ports for a unit. If the BV50 fails to connect, ensure the correct drivers are installed and the unit is in SSP.



By selecting the Program tab, you can reprogram the BV50. To begin the upload, click open file, then browse to the file location (usually Downloads) before clicking OK.

Once the file has been selected, its information will be populated and the Program device tab will become active. Finally, hit 'Program Device.' The unit's bezel will now begin to flash, signalling the update has begun.

When completed the unit will restart and a pop-up box will appear saying Device Programming Complete.

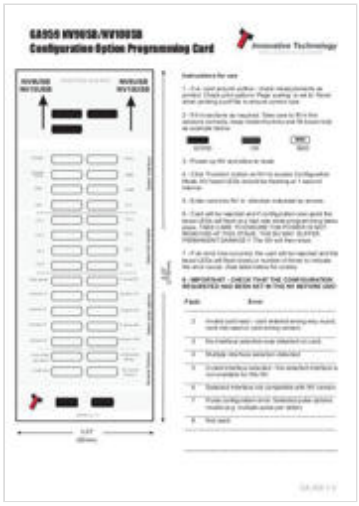
> Interrupting the download process can result in the unit entering a non-functional state. Once the process has started, it cannot be halted.

Configuration Card

Programming Mode

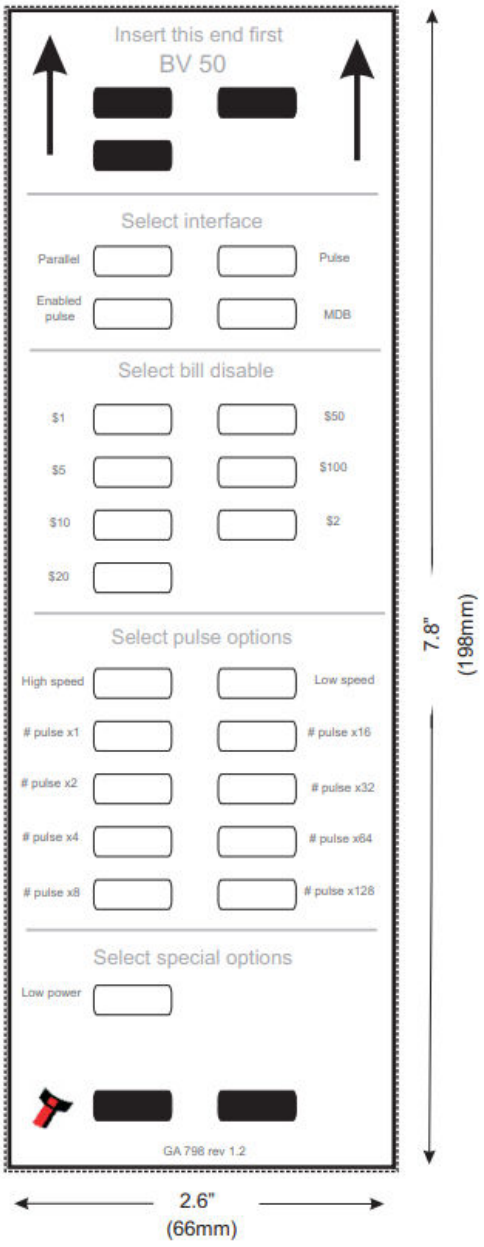
Press the configuration button once while the BV50 is powered up. If done correctly, the Bezel LED will flash every second. This indicates that the validator is ready for the insertion of a Configuration Card to change the Firmware Protocol in the BV50. This mode can be cancelled by pressing the configuration button once.

Please consult ITL technical document GA959 for further information on configuration card programming – the GA959 document includes a printable template for the configuration card and is available below:



Instructions for use

1	Cut card around the outline – check the measurements are as printed. Make sure that ‘Page scaling’ is set to ‘None’ in your print options to ensure the correct size.
2	Fill in sections as required. Take care to fill in the sections correctly, keep inside the lines and fill boxes fully as shown here: 
3	Power-up the validator and wait until it resets.
4	Press the configuration button once to enter programming mode (the bezel LEDs should flash at one second intervals).
5	Insert the card into the validator face up and in the direction indicated by the arrows.
6	The configuration card will be ejected and if the configuration was good the bezel LEDs will flash at a fast rate while programming takes place. After completion of programming, the validator will reset.

7	

Dip Switches

The latest version of the BV50 has dip-switches in place of the programming button (described: BV50 Appendix#%5BinlineExtension%5DSwitching-to-Programming-Mode-(SSP)), the table below shows the configuration:

Requires firmware 4.21 and above

Dip1	Dip2	Dip3	Interface
0	0	0	no override - selected by VM
0	0	1	SP4 (1 pulse per dollar)
0	1	0	IF4

Dip1	Dip2	Dip3	Interface
0	1	1	IF3 Standard
1	0	0	NISR
1	0	1	SP4 (4 pulses per dollar)
1	1	0	SSP
1	1	1	IF003 Extended Currency Channels

BV50 Protocols & Interfacing

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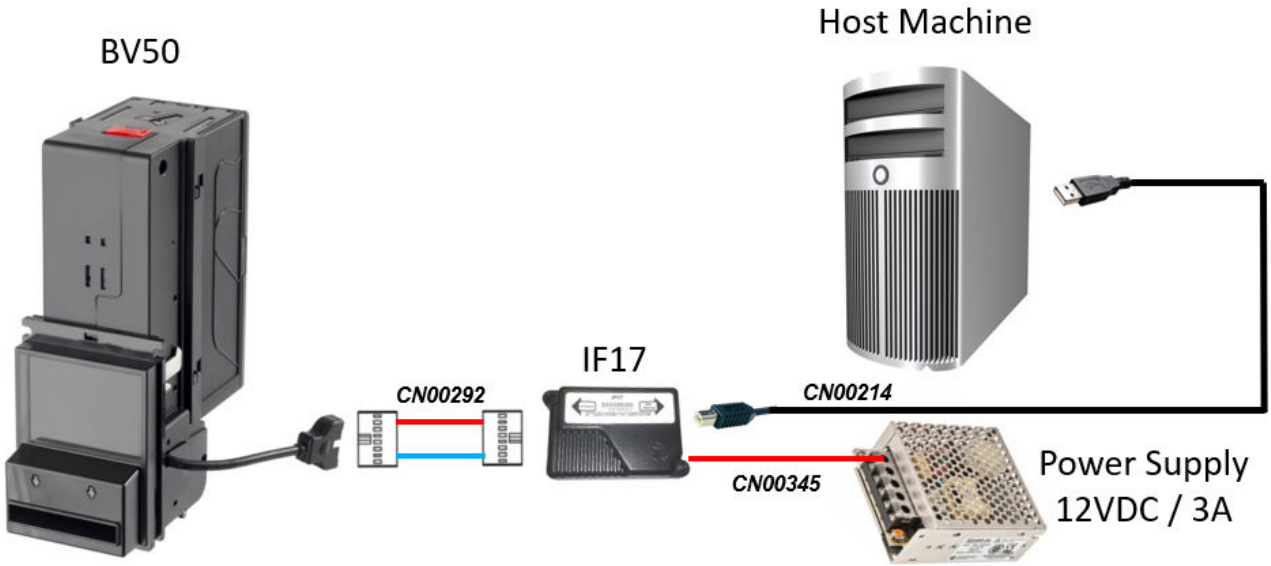
Interface Connectors

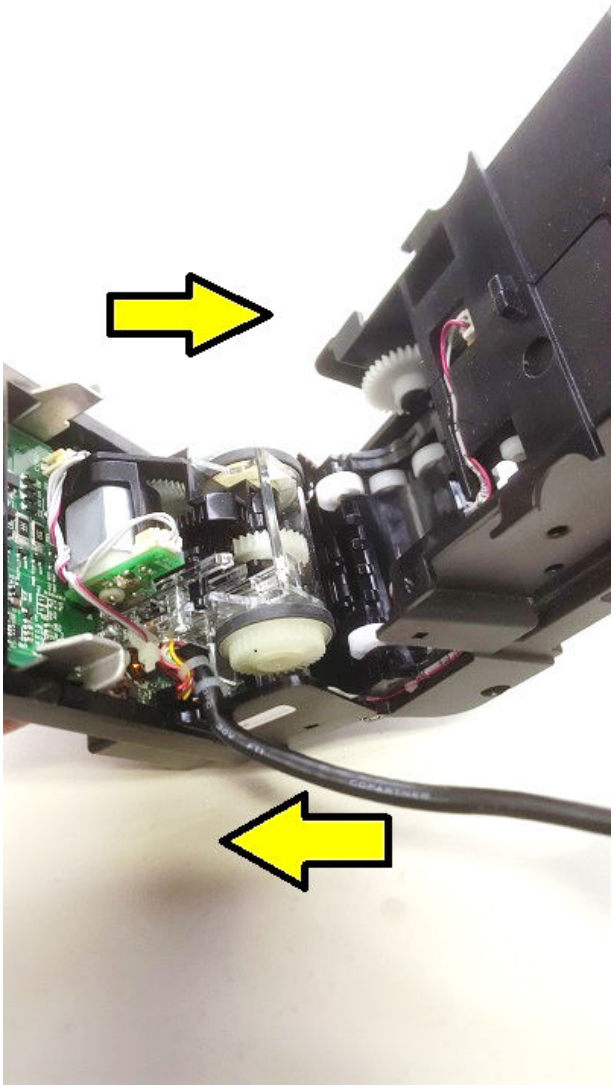
The BV50 has a 16-pin connection socket located on the side of the unit, this is used to interface the BV50 to the host machine.

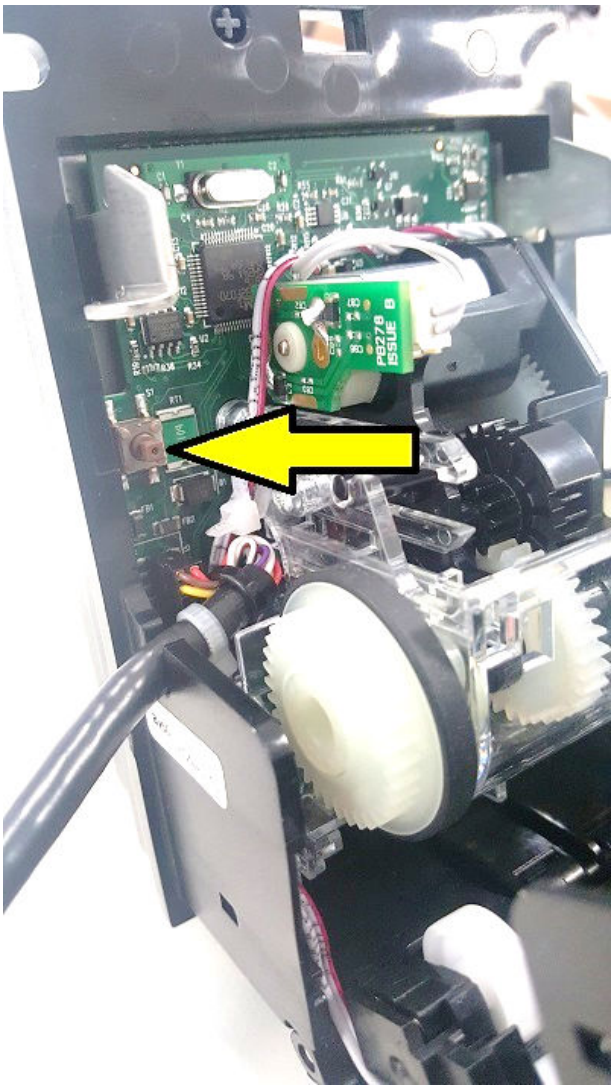


The pinout for this connection depends on the protocol that is being used in the host machine, refer to the relevant protocol section for further information

User Interface

The BV50 has a configuration button on the inside of the unit.

Description	Image
Open the head of the BV50 and swing open	

Description	Image
Config button is just above the main connector	

This button performs several functions as per the table below:

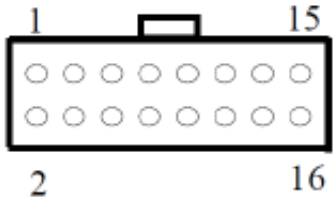
Configuration Button	Power Status	Function
Press and Hold (>2 Seconds)	ON	Sets BV50 to SSP Protocol (for programming)
Press Once	ON	Enables Configuration Card Programming Mode
Press Twice (within 1 second)	ON	LED Flashes a number of times to indicate current protocol / settings
Press and Hold While Power Is Applied	OFF/ON	Resets ccTalk key to default setting

SSP and eSSP

General Description

Smiley® Secure Protocol (SSP) and Encrypted Smiley® Secure Protocol (eSSP) are field proven secure interfaces specifically designed by Innovative Technology Ltd. to address the problems by cash handling systems in gaming machines. Problems such as acceptor swapping, re-programming acceptors and line tapping are all addressed. This interface is recommended for all new designs. Innovative Technology Ltd. provides full API upon request. Contact support@innovative-technology.co.uk for further information.

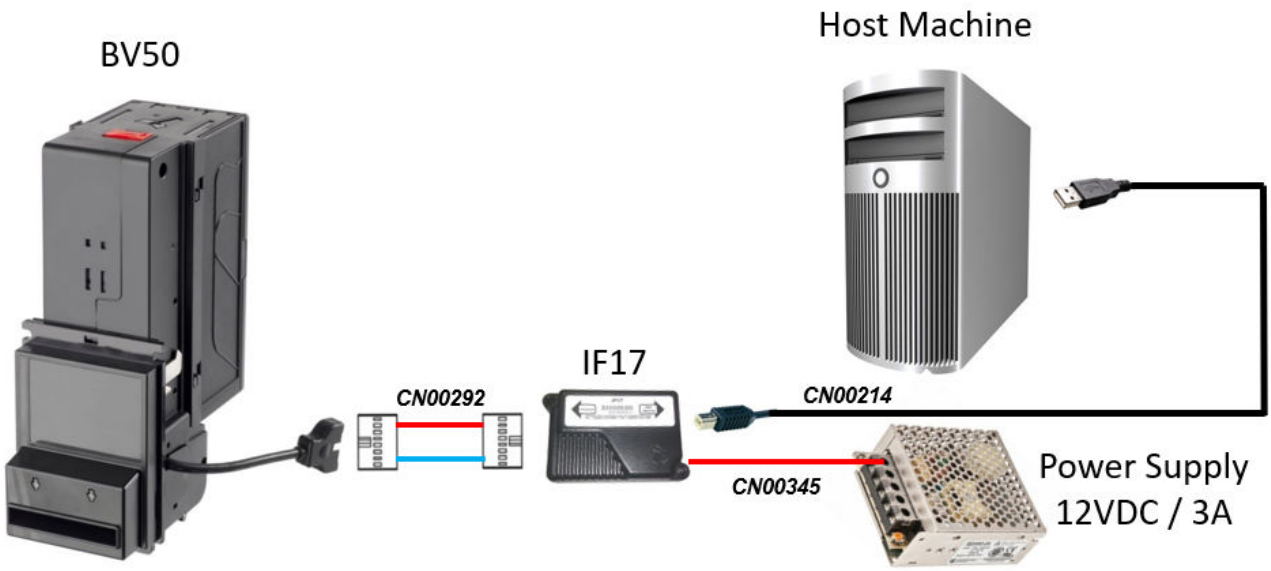
Pin Assignments



Pin	Name	Type	Description
1	**Vend1**	**Output**	**Serial Data Out (Tx)**
2 - 4	⚠ Not Used		
5	**Inhibit1**	**Input**	**Serial Data In (Rx)**
6 - 14	⚠ Not Used		
15	**+Vin**	**Power**	**+12VDC Supply**
16	**0V**	**Power**	**0V Supply (GND)**

Setup Examples

The drawing below highlights how to connect the BV50 to an SSP host machine using available cables and interfaces from Innovative Technology Ltd. For cable drawings refer to the appendix section Cable Drawings.



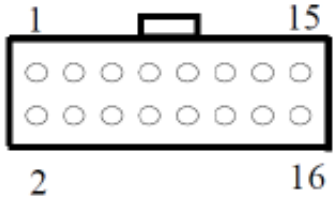
Type	ITL Part Number	Description
Cable	CN00292	SSP to Binary Interface Cable
Cable	CN00345	DA3 / IF17 / IF18 Power Cable
Cable	CN00214	USB Type A to B
Interface	IF17	TTL to USB Converter

ccTalk

General Description

ccTalk® is a serial communications protocol designed by Money Controls to allow 3-wire interfacing between a host machine and cash handling peripherals.

Pin Assignments



Pin	Name	Type	Description
1	**Vend1**	**Output**	**Serial Data (link to Pin 5)**
2 - 4	⚠ Not Used		
5	**Inhibit1**	**Input**	**Serial Data (link to Pin 1)**

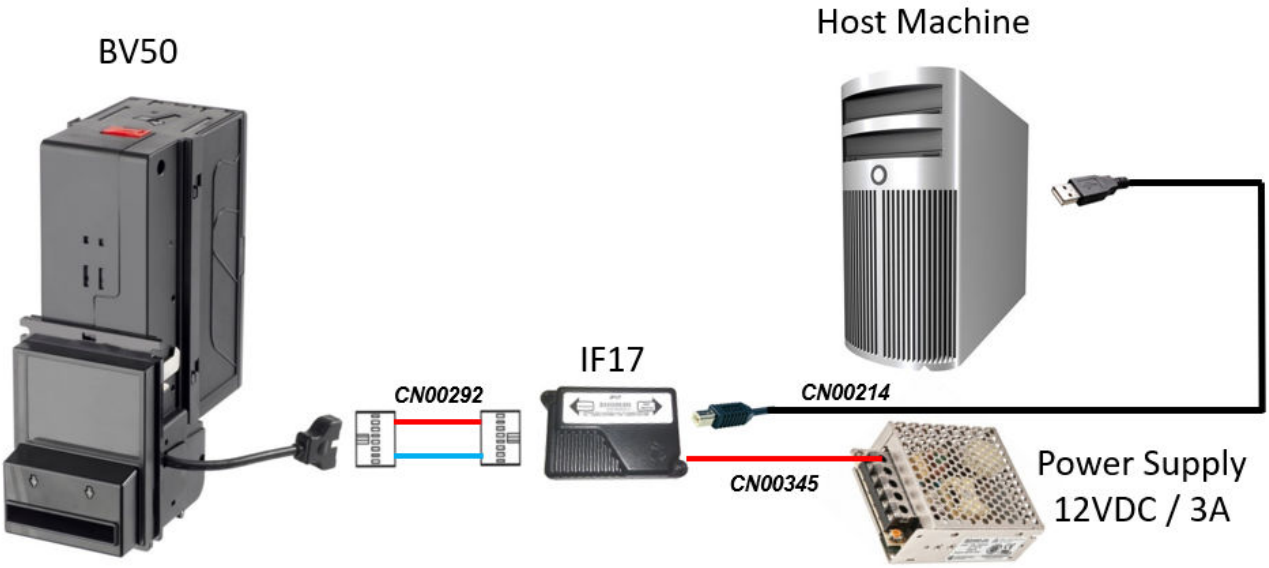
Pin	Name	Type	Description
6 - 14	⚠ Not Used		
15	**+Vin**	**Power**	**+12VDC Supply**
16	**0V**	**Power**	**0V Supply (GND)**

ccTalk - DES Encryption

When using ccTalk® DES encryption, the BV50 and host machine must exchange a secret key which forms the basis of the communication encryption. This exchange is performed in a Trusted Mode maintaining security. The Trusted Mode can only be entered by a physical access to the BV50. Please refer to ccTalk DES Encryption - Trusted Mode.

Setup Example Drawings

Same scheme could be used as for SSP connection:



Type	ITL Part Number	Description
Cable	CN00292	SSP to Binary Interface Cable
Cable	CN00345	DA3 / IF17 / IF18 Power Cable
Cable	CN00214	USB Type A to B
Interface	IF17	TTL to USB Converter

SIO and SI2

General Description

SIO and SI2 are outmoded and are not recommended for new developments

SIO (Serial Input/Output) is a very basic and low level serial communication interface. Messages are not echoed back. SIO uses 300 baud whereby SI2 uses 9600 baud.

There are 4 different combinations of SIO available:

- SIO 300 Baud
- SIO 300 Baud (Disabled at Start up) – A software enable must be sent to enable the validator.
- SIO 9600 Baud
- SIO 9600 Baud (Disabled at Start up) – A software enable must be sent to enable the validator.

The Baud rate of communications can be set at either 300 or 9600 using the Validator Manager Software. The data format according to the Baud rate used is shown in the table below:

Baud Rate	Start Bits	Data Bits	Stop Bits
300	1	8	2
9600	1	8	1

BV50 will receive and transmit the following event codes.

Recognised Receive Codes to BV50		Transmitted Codes from BV50	
MESSAGE	**DECIMAL VALUE**	**MESSAGE**	**DECIMAL VALUE**
Inhibit C1	131	Note Accept on C1	1
Inhibit C2	132	Note Accept on C2	2
Inhibit C3	133	Note Accept on C3	3
Inhibit C4	134	Note Accept on C4	4
Inhibit C5	135	Note Accept on C5	5
Inhibit C6	136	Note Accept on C6	6
Inhibit C7	137	Note Accept on C7	7
Inhibit C8	138	Note Accept on C8	8
Inhibit C9	139	Note Accept on C9	9
Inhibit C10	140	Note Accept on C10	10

Recognised Receive Codes to BV50		Transmitted Codes from BV50	
Inhibit C11	141	Note Accept on C11	11
Inhibit C12	142	Note Accept on C12	12
Inhibit C13	143	Note Accept on C13	13
Inhibit C14	144	Note Accept on C14	14
Inhibit C15	145	Note Accept on C15	15
Inhibit C16	146	Note Accept on C16	16
Un-inhibit C1	151	Note Not Recognised	20
Un-inhibit C2	152	Mechanism running slow	30
Un-inhibit C3	153	Strimming attempted	40
Un-inhibit C4	154	Note Rejected (fraud channel)	50
Un-inhibit C5	155	STACKER Full or Jammed	60
Un-inhibit C6	156	Abort During Escrow	70
Un-inhibit C7	157	Note may have been taken to clear jam	80
Un-inhibit C8	158	Validator Busy	120
Un-inhibit C9	159	Validator Not Busy	121
Un-inhibit C10	160	Command Error	255
Un-inhibit C11	161		
Un-inhibit C12	162		
Un-inhibit C13	163		
Un-inhibit C14	164		
Un-inhibit C15	165		
Un-inhibit C16	166		

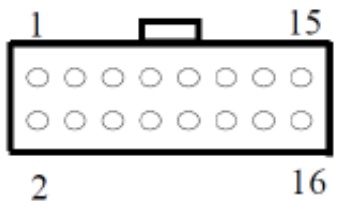
Recognised Receive Codes to BV50		Transmitted Codes from BV50
Enable serial escrow mode	170	
Disable serial escrow mode	171	
Accept escrow	172	
Reject escrow	173	
Status	182	
Enable all	184	
Disable all	185	
Disable escrow timeout	190	
Enable escrow timeout	191	

Example transactions are shown below:

Event	Validator	Decimal Value	Host
Note entered into validator	Validator Busy	120 →	
Note accepted channel 2	Validator Ready	121 →	
	Accept on channel 2	2 →	
Note entered into validator	Validator Busy	120 →	
Note not recognised	Validator Ready	121 →	
	Note not recognised	20 →	
Validator has returned note	Validator Ready	121 →	
Software Inhibit Channel 4	Inhibit C4	← 134	Inhibit C4
	Channel 4 inhibited	134 →	

Event	Validator	Decimal Value	Host
Software Enable Channel 4	Uninhibit C4	ç154	Uninhibit C4
	Channel 4 inhibited	154 →	
Status Report		← 182	Status Request
	Status Requested	182 →	
3 byte status message	Inhibit status Channels 1-8	Byte 1 →	
	Inhibit status Channels 9-16	Byte 2 →	
	Escrow On (=1) / Off (=0)	Byte 3 →	
Turn on Escrow Mode		← 170	Enable Escrow Mode
	Escrow Mode Enabled	170 →	
Note accept in Escrow Mode			
Note entered into validator	Validator Busy	120 →	
Note Accepted Channel 2	Validator Ready	121 →	
	Accept on Channel 2	2 →	
		← 172	Accept Note in Escrow
	Accept Escrow	172 →	
	Accept on Channel 2	2 →	

Pin Assignments



Pin	Name	Type	Description
1	**Vend1**	**Output**	**Serial Data Out (Tx)**
2 - 4	⚠ Not Used		
5	**Inhibit1**	**Input**	**Serial Data In (Rx)**
6 - 14	⚠ Not Used		
15	**+Vin**	**Power**	**+12VDC Supply**
16	**0V**	**Power**	**0V Supply (GND)**

MDB

General Description

MDB (Multi-Drop Bus) is used in the vending industry and is now an open standard in the NAMA (National Automatic Merchandising Association) so that all vending and peripheral equipment communicates identically. MDB uses a master-slave model where the VMC (Vending Mechanism Controller) is the master that can communicate with up to 32 slaves (e.g. banknote validator or coin acceptor).

Note:

•Please refer to the Multi-Drop Bus specification for the suggested current drive circuits available.

•The BV50 supports the MDB Protocol version 1, level 1.

•For detailed information and full protocol specification refer to www.vending.org

•MDB address: - 0x30

The BV50 Bank Note Validators have a unique address – 00110XXX binary (30H). The VMC polls the bus to detect presence of the BV50 Validator or get information on the current status of the validator.

The validators will respond when asked for activity with an acknowledgment, a negative acknowledgment or a specific reply, depending on its current status. Bus crashes are avoided as the validators respond to being polled only by the VMC.

The international country code must be set for the country in which the validators will be operating. This is either the international telephone code for that country, or the country code taken from ISO4217. The code is represented as two bytes. The initial digit signifies the source of the code. 0 signifies the telephone code is used, 1 signifies ISO4217 has been used. For the USA the country code is 00 01, or 18 40 For Great Britain the code is 00 44, or 18 26.

The scaling factor must also be specified for each validator. All accepted note values must be evenly divisible by this number.

•This number would be set to 100 (Hex 64) for the Euro or Great Britain.

•The number would be set to 1000 (Hex 03E8) for Columbia.

•The number of decimal places must also be programmed for each validator

•The number would be set to 2 for Euro or USA

•The number would be set to 3 for Columbia

Adopting the numbers above:

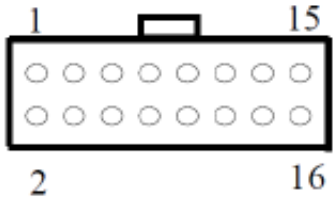
•£5 would be displayed as 5.00

•£10 would be displayed as 10.00

•$1 would be displayed as 1.00

•1K Columbia would be displayed as 1.000

Pin Assignments



Pin	Name	Type	Description
1	**Vend1**	**Output**	**Serial Data Out (Tx)**
2 - 4	⚠ Not Used		
5	**Inhibit1**	**Input**	**Serial Data In (Rx)**
6 - 14	⚠ Not Used		
15	**+Vin**	**Power**	**+12VDC Supply**
16	**0V**	**Power**	**0V Supply (GND)**

IF5 Interface

A BV50 running MDB can use an IF5 MDB Voltage Converter, an external interface box, which regulates the power supply and opto-isolates the communication lines. Typically vending machine's power supply higher voltage than the maximum for the BV50. The IF5 drops this higher voltage down to the required level.

Type	ITL part number	Description
Interface	PA02061	IF5 KIT - MDB Voltage Converter

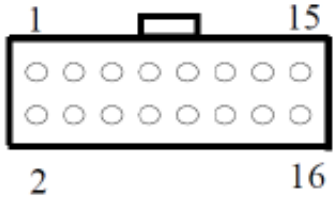
Parallel

General Description

Parallel is a 4-way output interface. The first 4 channels have their own individual output which means that only a maximum of 4 channels can be used. If a note is recognised the relevant Vend line is set to low for a period of 100 ± 3ms. Pulses outside these limits should be rejected as a precaution against false triggering.

Parallel is an unsecure interface and should not be used for new developments!

Pin Assignments



Pin	Name	Type	Description
1	Vend 1	Output	Credit Output Channel 1
2	Vend 2	Output	Credit Output Channel 2
3	Vend 3	Output	Credit Output Channel 3
4	Vend 4	Output	Credit Output Channel 4
5	Inhibit 1	Input	Inhibit Input Channel 1 by holding HIGH, hold LOW to enable
6	Inhibit 2	Input	Inhibit Input Channel 2 by holding HIGH, hold LOW to enable
7	Inhibit 3	Input	Inhibit Input Channel 3 by holding HIGH, hold LOW to enable
8	Inhibit 4	Input	Inhibit Input Channel 4 by holding HIGH, hold LOW to enable
9	Busy	Output	Output Busy Signal. Active LOW when BV50 is in transporting, reading or stacking a note

Pin	Name	Type	Description
10	**Escrow**	**Input**	**Input Escrow Control. Enable escrow function by holding LOW**
11 - 14	⚠ Not Used		
15	**+Vin**	**Power**	**+12VDC Supply**
16	**0V**	**Power**	**0V Supply (GND)**

Inhibit Control

The Inhibits can be used to either enable or disable the acceptance of those banknotes programmed on channels 1, 2, 3 and 4. The Inhibits are internally held high and must be set to low (GND) to enable banknote acceptance. If no Inhibit is set to low (GND) the Master Inhibit is set and the BV50 is disabled.

Escrow Control

The BV50 has a single note escrow facility. This allows the BV50 to hold onto the note once validated, and then only stack the note into a cashbox when the host machine confirms that the Vend operation has been completed. Hold pin 10 LOW to enable the single note escrow function. If the host machine aborts the transaction by setting the corresponding inhibit input HIGH, the note is returned immediately.

The host machine can force the return of the 30 second time-out. Setting HIGH on all the inhibits causes all notes rejected. In the event of a note being forcibly removed from the BV50 bezel during the 30-second interval, the BV50 will go out of service for 45 seconds.

Please refer to Escrow Control and the Escrow Timing Diagram for further details.

Busy Control

This is a general-purpose busy signal. It is active low (pin 9) while the BV50 is in operation.

Low Power Mode

The Low Power Mode can be used to reduce the power consumption of the BV50 when idle. When the Low Power Mode option is set, the BV50 goes into the Low Power Mode after about 6 seconds after the BV50 is powered up and remains in this state until a note is entered. Following a note insertion, the BV50 returns to Low Power Mode approximately 1 second after a credit is given or note is rejected. Please refer to Low Power Mode Timing Diagram for further details

In Low Power Mode the front sensor is checked every second which can lead to a delay in accepting the note when it is presented.

Configuration button functions are only available during power up before the BV50 goes into Low Power Mode!

IF10 Interface

The IF10 interface allows serial SSP to be used in machines without the need of updating the machine software. The IF10 is connected between the BV50 and the host machine. The IF10 communicates with the BV50 in serial SSP which gives more security along the length of the cable. The IF10 should be mounted close to the host machine control board where the IF10 converts to the parallel connection.

Type	ITL part number	Description
Interface	PA02319	IF10 Kit – SSP To Parallel

Binary

General Description

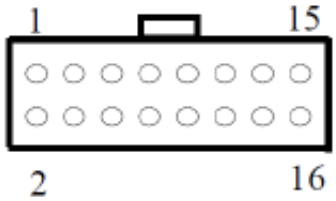
In the event that the machine needs more than 4 denominations to be recognised but the host machine cannot take advantage of the serial communication method then the BV50 can be set to give a binary pattern output on the four parallel output pins. If the BV50 is set to Binary it will issue the vend signals as a binary pattern on the parallel outputs for 100 ± 3 ms. In this way a maximum of 15 different notes can be accepted and 4 notes individually inhibited.

The four channels have their own individual outputs. If a note is recognised the binary representation of the channel number will be pulled low for 100 ± 3 mS. Pulses outside these limits will be rejected as a precaution against false triggering due to noise.

For example, if a note programmed on channel 3 is credited vend 1 (2^0 = 1 decimal) and vend 2 (2^1 = 2 decimal) will be active low for 100 ± 3 mS.

Binary is an insecure interface and should not be used for new developments

Pin Assignments



Pin	Name	Type	Description
1	Vend 1	Output	Credit Output binary 2^0 = 1 decimal
2	Vend 2	Output	Credit Output binary 2^1 = 2 decimal
3	Vend 3	Output	Credit Output binary 2^2 = 4 decimal
4	Vend 4	Output	Credit Output binary 2^3 = 8 decimal
5	Inhibit 1	Input	Inhibit Input Channel 1
6	Inhibit 2	Input	Inhibit Input Channel 2

Pin	Name	Type	Description
7	**Inhibit 3**	**Input**	**Inhibit Input Channel 3**
8	**Inhibit 4**	**Input**	**Inhibit Input Channel 4**
9	**Busy**	**Output**	**Output Busy Signal**
10	**Escrow**	**Input**	**Input Escrow Control**
11 - 14	⚠ Not Used		
15	**+Vin**	**Power**	**+12VDC Supply**
16	**0V**	**Power**	**0V Supply (GND)**

Inhibit Control

The Inhibits can be used to either enable or disable the acceptance of those banknotes programmed on channels 1, 2, 3 and 4.

The Inhibits are internally held high and must be set to low (GND) to enable banknote acceptance. If no Inhibit is set to low (GND) the Master Inhibit is set and the BV50 is disabled.

Escrow Control

The BV50 has a single note escrow facility. This allows the BV50 to hold onto the note once validated, and then only stack the note into a cashbox when the host machine confirms that the Vend operation has been completed.

Please refer to Escrow Control and the Escrow Timing Diagram for further details.

Low Power Mode

The Low Power Mode can be used to reduce the power consumption of the BV50 when idle. When the Low Power Mode option is set, the BV50 goes into the Low Power Mode after about 6 seconds after the BV50 is powered up and remains in this state until a note is entered. Following a note insertion, the BV50 returns to Low Power Mode approximately 1 second after a credit is given or note is rejected. Please refer to Low Power Mode Timing Diagram for further details

In Low Power Mode the front sensor is checked every second which can lead to a delay in accepting the note when it is presented.

Configuration button functions are only available during power up before the BV50 goes into Low Power Mode!

IF9 Interface

The IF9 interface allows serial SSP to be used in machines without the need of updating the machine software. The IF9 is connected between the BV50 and the host machine. The IF9 communicates with the BV50 in serial SSP which gives more security along the length of the cable. The IF9 should be mounted close to the host machine control board where the IF9 converts to the binary connection.

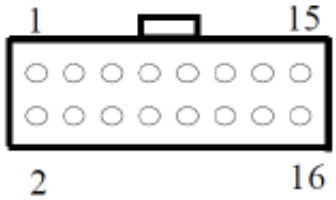
Type	ITL part number	Description
Interface	PA02318	IF9 Kit – SSP to Binary

Pulse

General Description

Pulse can be used for the acceptance of up to 16 channels. When a note is recognised vend 1 (pin 1) will pulse a pre-set number of times. The amount of pulses as well as the high/low pulse ratio is configurable.

Pin Assignments



Pin	Name	Type	Description
1	**Vend 1**	**Output**	**Credit Output Pulse Stream**
2 - 4	⚠ Not Used		
5	**Inhibit 1**	**Input**	**Inhibit Input Channel 1**
6	**Inhibit 2**	**Input**	**Inhibit Input Channel 2**
7	**Inhibit 3**	**Input**	**Inhibit Input Channel 3**
8	**Inhibit 4**	**Input**	**Inhibit Input Channel 4**
9	**Busy**	**Output**	**Output Busy Signal**
10	**Escrow**	**Input**	**Input Escrow Control**
11 - 14	⚠ Not Used		
15	**+Vin**	**Power**	**+12VDC Supply**
16	**0V**	**Power**	**0V Supply (GND)**

Inhibit Control

The Inhibits can be used to either enable or disable the acceptance of those banknotes programmed on channels 1, 2, 3 and 4.

The Inhibits are internally held high and must be set to low (GND) to enable banknote acceptance. If no Inhibit is set to low (GND) the Master Inhibit is set and the BV50 is disabled.

Escrow Control

The BV50 has a single note escrow facility. This allows the BV50 to hold onto the note once validated, and then only stack the note into a cashbox when the host machine confirms that the Vend operation has been completed.

Please refer to Escrow Control and the Escrow Timing Diagram for further details.

Low Power Mode

The Low Power Mode can be used to reduce the power consumption of the BV50 when idle. When the Low Power Mode option is set, the BV50 goes into the Low Power Mode after about 6 seconds after the BV50 is powered up and remains in this state until a note is entered. Following a note insertion, the BV50 returns to Low Power Mode approximately 1 second after a credit is given or note is rejected. Please refer to Low Power Mode Timing Diagram for further details

In Low Power Mode the front sensor is checked every second which can lead to a delay in accepting the note when it is presented.

Configuration button functions are only available during power up before the BV50 goes into Low Power Mode!

Credit Hold Function

If this function is enabled the BV50 will take the notes as normal but then wait until the escrow line is toggled low/high before it will then give out the pulses per denomination as set. After the pulses have been given, the BV50 will wait for another low/high toggle until the full value of credit pulses are given.

For example, with a setting of 2 pulses per dollar, a five dollar bill will give 2 pulses 5 times.

A Typical use of this option would be for a Pool table with a game price of $1. You could insert a $5 note and press a button that toggles the escrow line and releases the pool balls, this would then allow you to play the first game. The Validator holds onto the remaining credits until the game has finished and the button is pressed again allowing the next game to begin, this continues until all the credits have been used.

IF26 Interface

The IF26 interface allows serial SSP to be used in machines without the need of updating the machine software. The IF26 is connected between the BV50 and the host machine. The IF26 communicates with the BV50 in serial SSP which gives more security along the length of the cable. The IF26 should be mounted close to the host machine control board where the IF15 converts to the pulse connection.

Type	ITL part number	Description
Interface	PA03520	IF26 Kit – SSP to Pulse

Special Pulse (SP4)

This is a modified version of pulse which ignores the inhibit lines, the BV50 can be seen as always enabled – this is typically used in older machines which didn't implement inhibits.

BV50 Service Guide

Contents

Routine Maintenance

Introduction

The BV50 has been designed to minimize any performance variation over time. Much of this is achieved by careful hardware and software design. However, depending upon the environment the BV50 may at some time require cleaning or note path clearing.

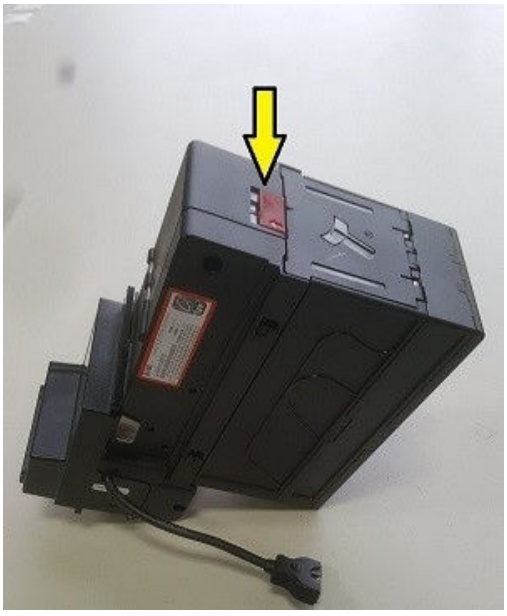
Recommended Cleaning Intervals

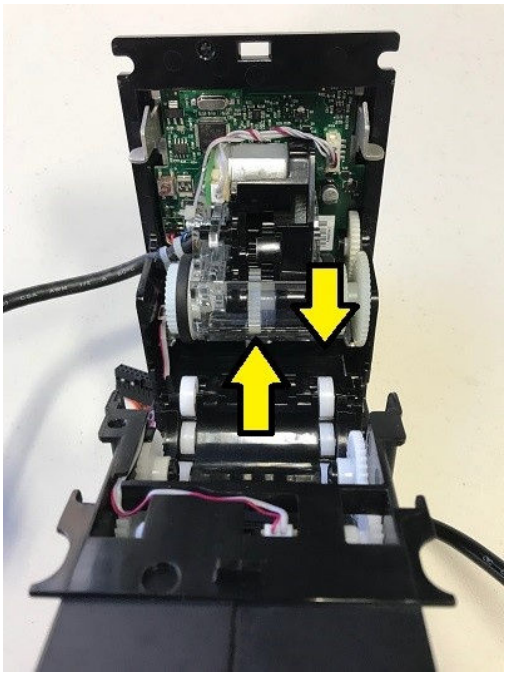
Innovative Technology Ltd recommends cleaning the optical lenses every month or as required. Dirt, dust or other residue leads to bad note acceptance and other performance degradation.

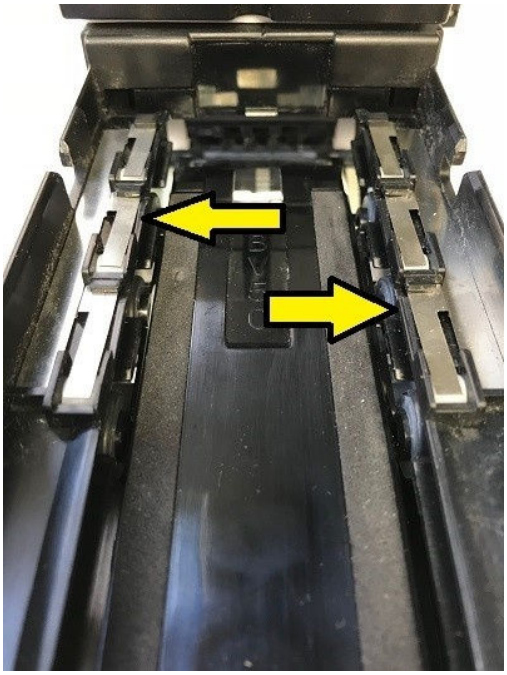
Cleaning the BV50

Disconnect the power **BEFORE** carrying out any cleaning operations to avoid the risk of causing damage to the validator.

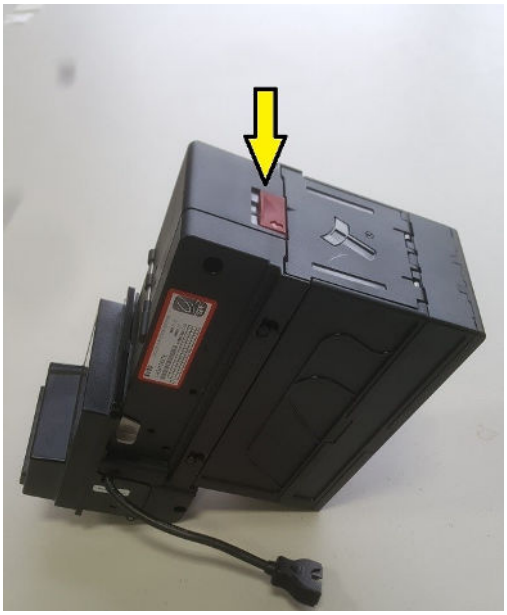
Do not use solvent based cleaners such as alcohol, petrol, methylated spirits, white spirit or PCB cleaner. This will result in permanent damage to the BV50, only use a clean dry cloth or a mild detergent where absolutely necessary.

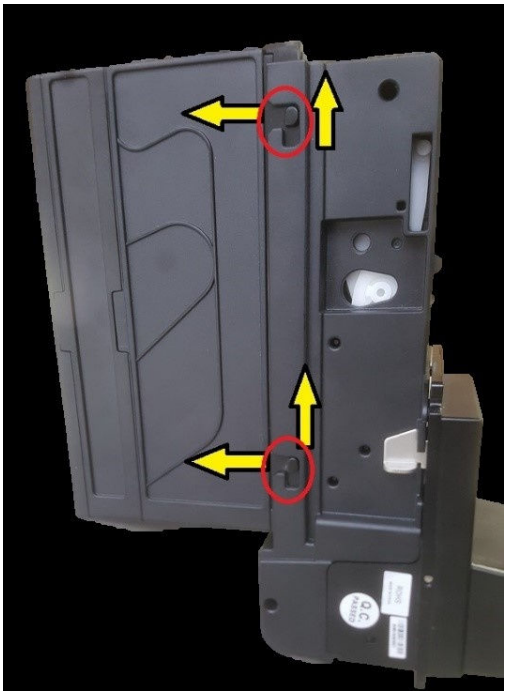
1	**Remove the cash box.** Remove the cash box from the unit by pressing up on the red clip and sliding the cash box off.	

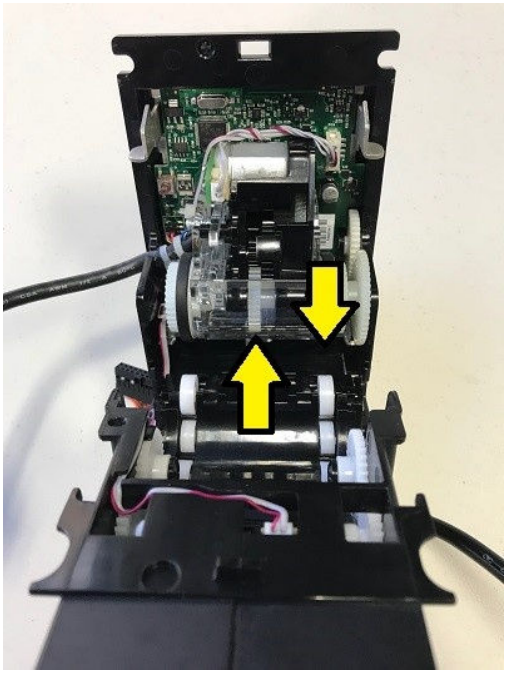
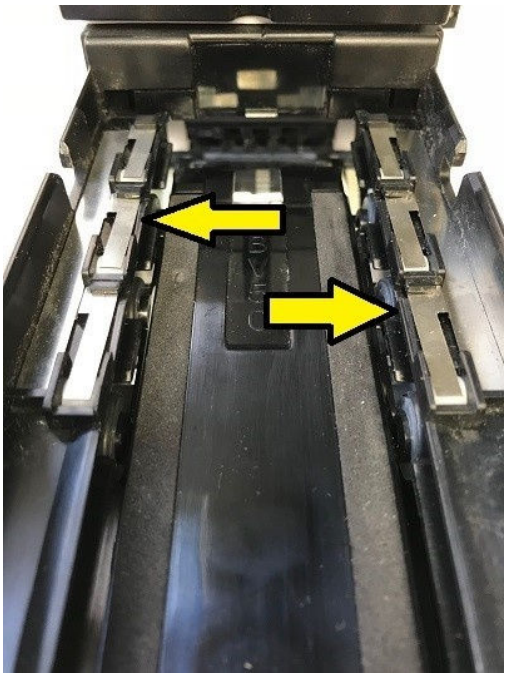
2	**Open the head on the BV.** Press on the two metal tabs on either side of the unit. This will release the BV head and allow for access to the head for cleaning.	
3	**Cleaning the BV** Carefully wipe the surfaces with a soft lint free cloth that has been dampened with a water and mild detergent solution (i.e. household washing up liquid). Remove any build up on the rollers.	

4	**Bill Path Cleaning** Carefully wipe the surfaces with a soft lint free cloth that has been dampened with a water and mild detergent solution (i.e. household washing up liquid). Remove any build up on the rollers.	

Clearing a Jam

1	**Removal of the cash box.** To remove the cash box, slide the red clip forward on the rear of the cash box and hold it in the upwards position.	

2	**Slide the cash box off.** With the red clip held in the upwards position, slide the cash box up and pull outwards. You can see the slotted holes on the side of the unit where the cash box slides in and out.	
3	**Opening the BV head unit.** Press down on both metal clips and pull the head of the unit down and outward. The head of the unit should swivel open to about a 90-deg. angle. Do not force the unit open more than 90-deg. As this could damage the wiring.	

4	**Checking for Jams** With the unit open check, the bill paths for and jams or debris that may be blocking the path or sensors.	
5	**Check Cash Box Area** Flip the unit over and check the cash box area and note path rollers for any jams or debris then reassemble the unit.	

Checking Device Configuration

To check settings on a programmed unit:

Power up the unit.
Click the red configuration button present inside of the unit twice.
Count the bezel flash sequence.
Refer to the following table for device configuration.

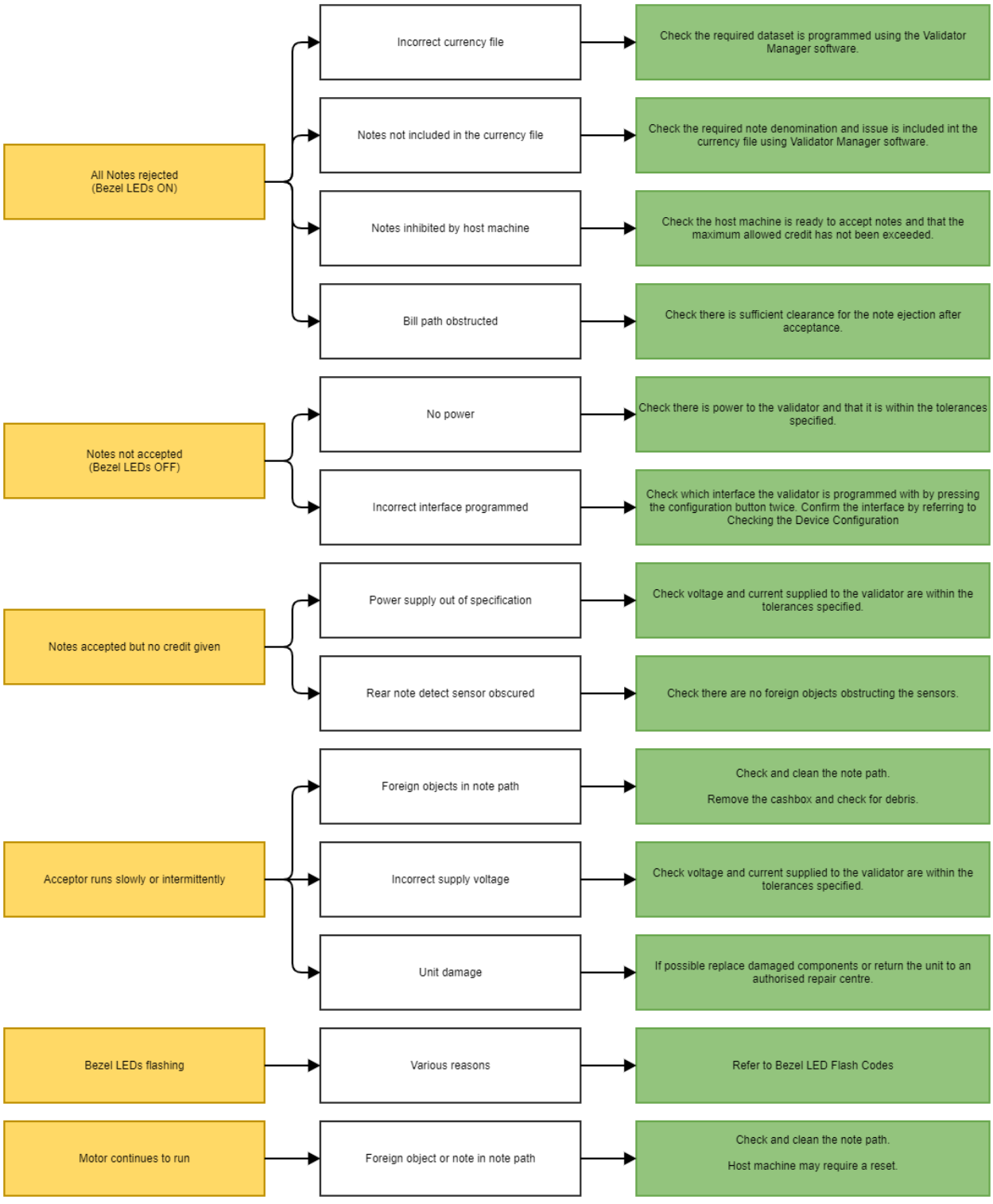
Flashes	Interface	Interface Settings											
		CCT Plain	CCT 8-bit	No Escrow Timeout	DES	Low Power	High Speed	Pulse High	Pulse low	Pulse per £	SIO Start disabled	Credit hold	Binary
1	SSP												
2	Pulse							ms/10	ms/10	Value		3	
3	MDB												
4	IF3												
6	ccTalk	1	2	3	4								
7	SIO			3			1				2		
8	Parallel			2									1
9	SP4							ms/10	ms/10	Value		3	
10	NS												
11	IF32						1						

Bezel LED Error Flash Codes

The BV50 has two arrows on the head of the unit indicating the status of the unit. If there is an error the two green arrows will flash a series of long and short flashes,

Number of Long Flashes	Number of Short Flashes			
	1	2	3	4
1	Note Path Open	Note Path Jam	Unit not Initialised	N/A
2	Cashbox Removed	Cashbox Jam	N/A	N/A
3	Firmware Checksum	Interface Checksum	EEPROM Checksum	Dataset Checksum
4	PSU too Low	PSU too High	N/A	N/A

Fault Finding Flow Chart



Checking Power Connections

Check Power Source
Make sure the power is turned on from the power source and that it is supplying the required 12V DC required.

Check your connections
Check the cables from the power source to the BV. Make sure all connections are tight and secure

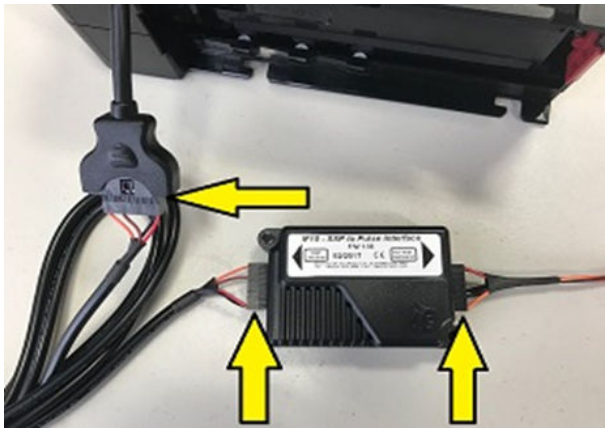
Check pins
Check the connector pins on the BV. Make sure there are no bent or broken pins.

Reset Machine
If everything is connected properly, reset the machine and check the power again.

Checking Communication Connections

Check Connections
Make sure all cables are secured and connected. If there are other devices inline, make sure the cable going into and out of those devices are secure.

If a specific port is being called ensure the BV is connected to the correct port.



Is the unit on?
Make sure that the BV and the machine are both powered on.

Protocol
Check the BV Protocol and make sure it is set correctly. If the unit is in a different protocol then the machine is expecting it, it will not communicate.

To check the protocol simply locate the configuration button and double press it a series of flashes will tell you the protocol the unit is set for.

Refer to the chart in the Checking Device Configuration section in BV50 First Level Support.

BV50 Product Compliance

EC Declaration of Conformity

CE Marking

The BV50 unit described in this manual set has been designed to comply with the relevant sections of the following Harmonised European Standards:

- EN60950-1:2001
- EN60335-1:2002
- EN60335-2-82:2003

The unit complies with all the applicable essential requirements of the Standards.

RoHS

The following products, identified by the part numbers listed in the table below, are compliant with the European Union Directive 2002/95/EC of the Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment.

Product	Description	Lead Free Date
BV50ST	Bank Note Acceptor Assembly	All BV50ST

We hereby declare that lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr4-6), polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), are not intentionally added to our products in amounts exceeding the maximum concentration values as defined by RoHS regulations (except where the application of any of those substances comes within the scope of the RoHS regulations exempted applications).

All compliant products are clearly marked on the product and/or packaging.

All the information provided in this statement of compliance is accurate to the best of our knowledge, as of the date of this publication being issued.

WEEE

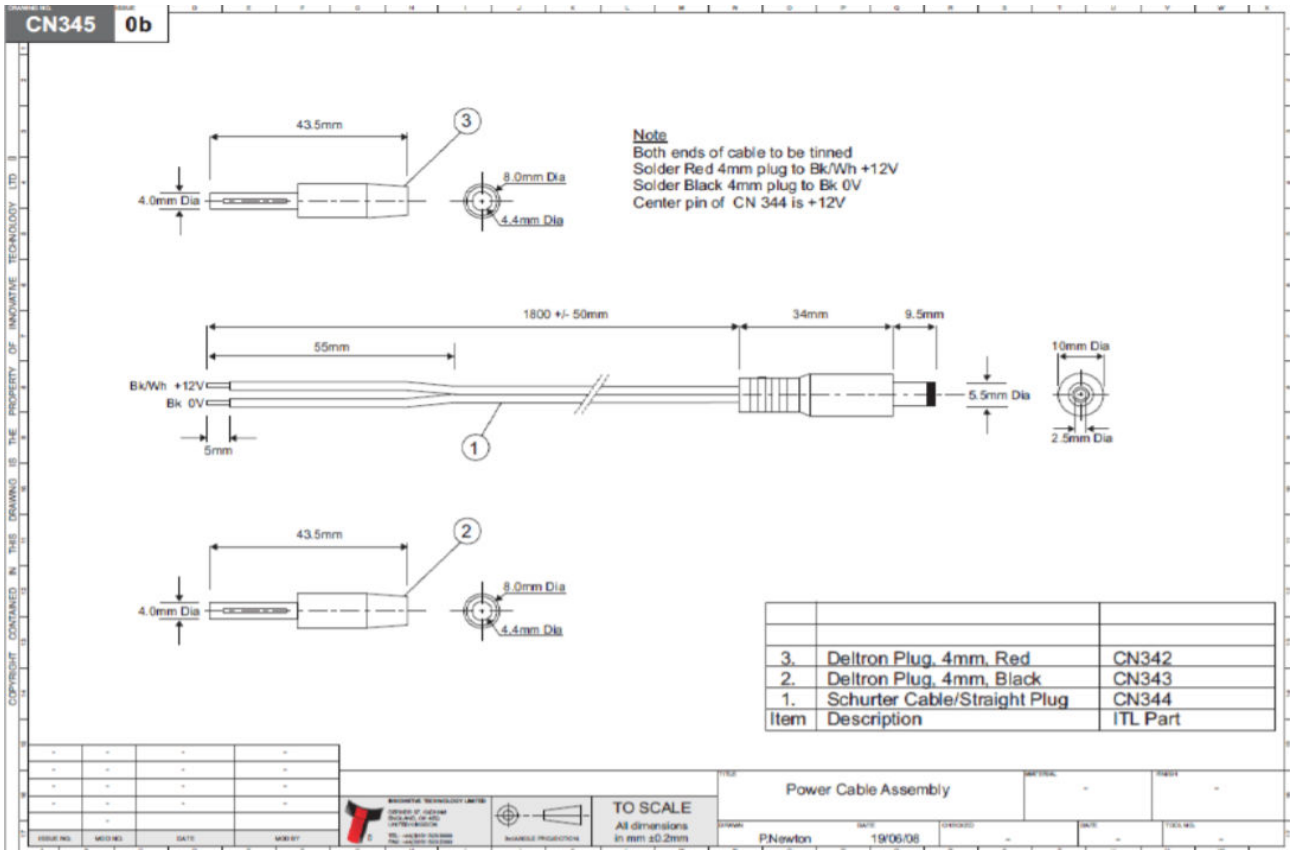
The European Union's directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) was adopted by the European Council and Parliament in 2003 with a view to improving the collection and recycling of Waste

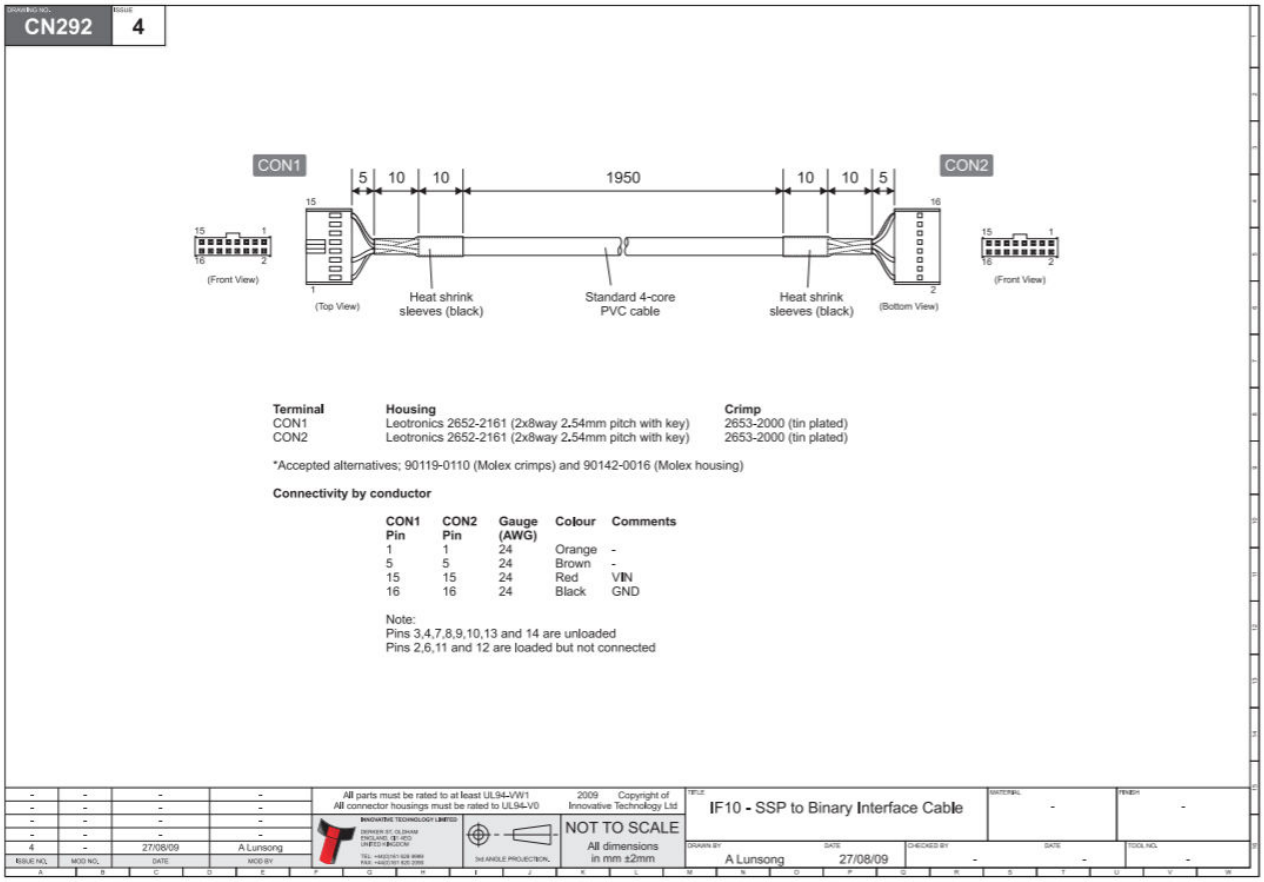
Electrical and Electronic Equipment throughout the EU, and to reduce the level of non-recycled waste. The directive was implemented into law by many EU member states during 2005 and 2006.

BV50 Appendix

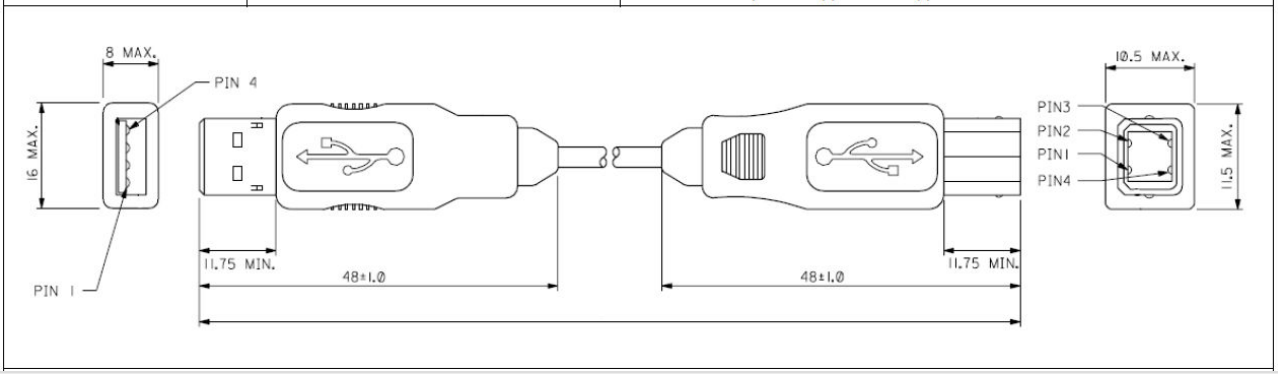
Contents

Cable Drawings





ITL Part Number	Description	Details
CN214	USB Cable	USB 2.0 Compliant Type A to Type B cable

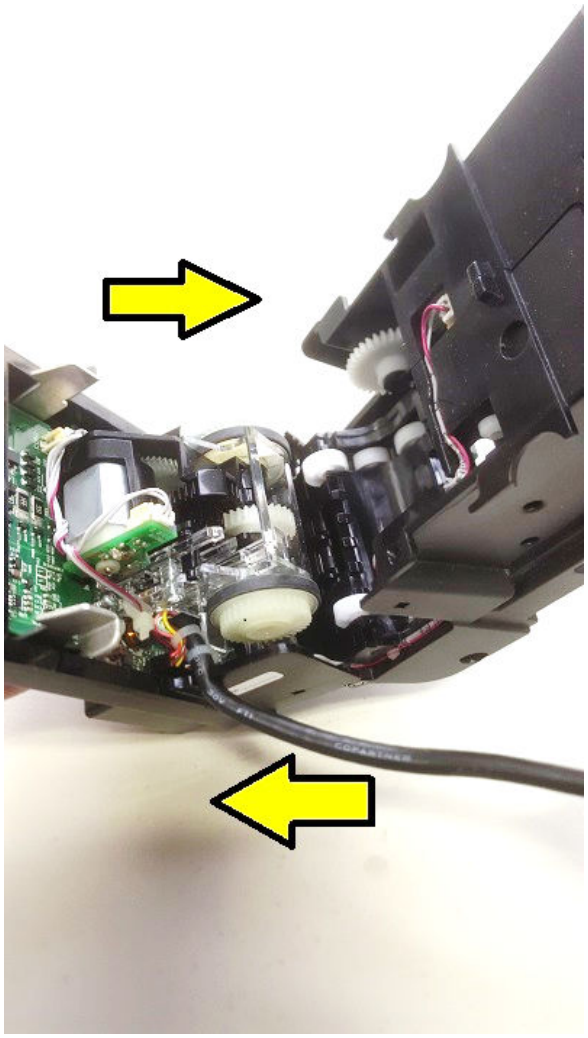


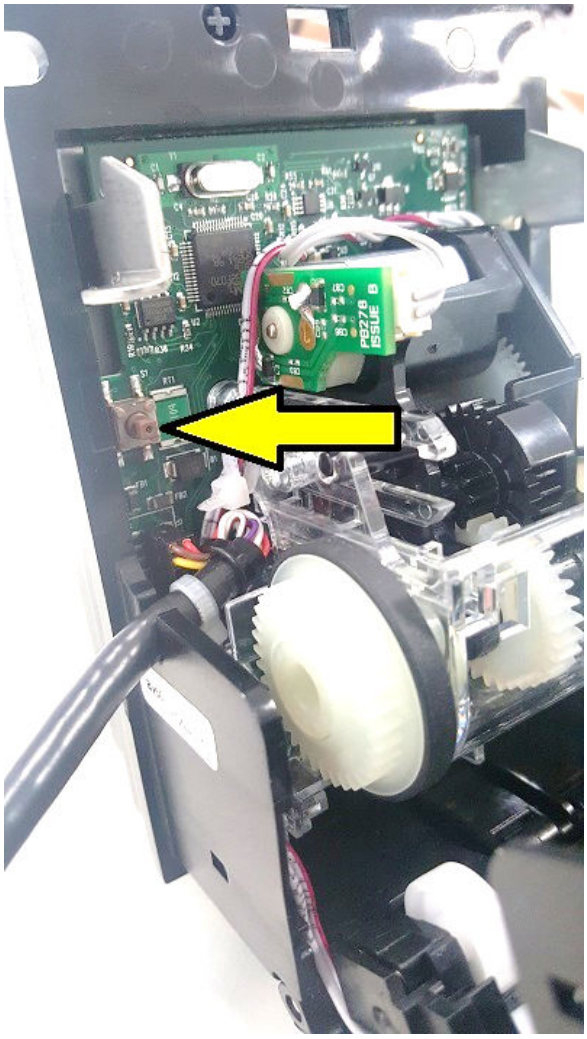
Connector Specifications

Type	Vendor	Part Number	Pins	Pitch	Polarising
Housing	Leotronics	2652-2161	2x8	2.54mm	With Key
Crimp	Leotronics	2653-2000			Female
Housing	Molex	90142-0016	2x8	2.54mm	With Key
Crimp	Molex	90119-2121			Female

Switching to Programming Mode (SSP)

The BV50 has a configuration button on the inside of the unit

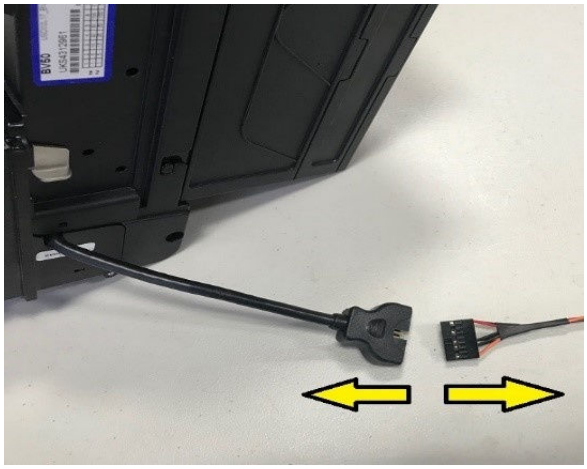
1	Open the head of the BV50 and swing open	

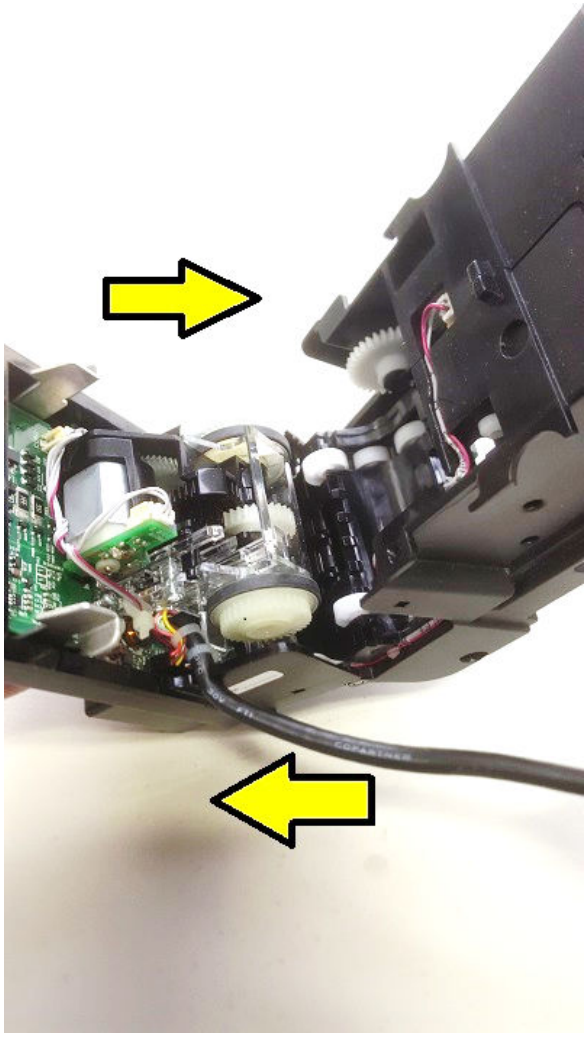
2	Config button is just above the main connector	

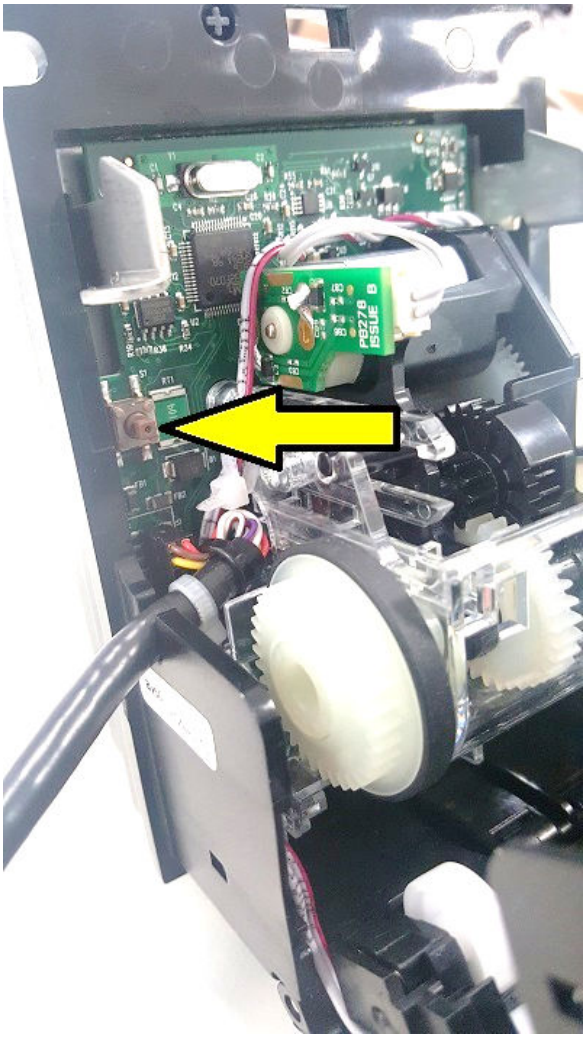
Press and hold the configuration button for approximately 3 seconds while the BV50 is powered up (until the bezel LED illuminates). The Bezel LED will flash rapidly as the button is released to indicate that SSP is being loaded. Once this process has finished the BV50 will reset. The BV50 will now be in Programming Mode (SSP) and allow connection to a PC via a CN00292 cable, IF17 adapter or connection to a DA3.

Pressing and holding the button again will return the BV50 to its original interface.

ccTalk DES Trusted Mode

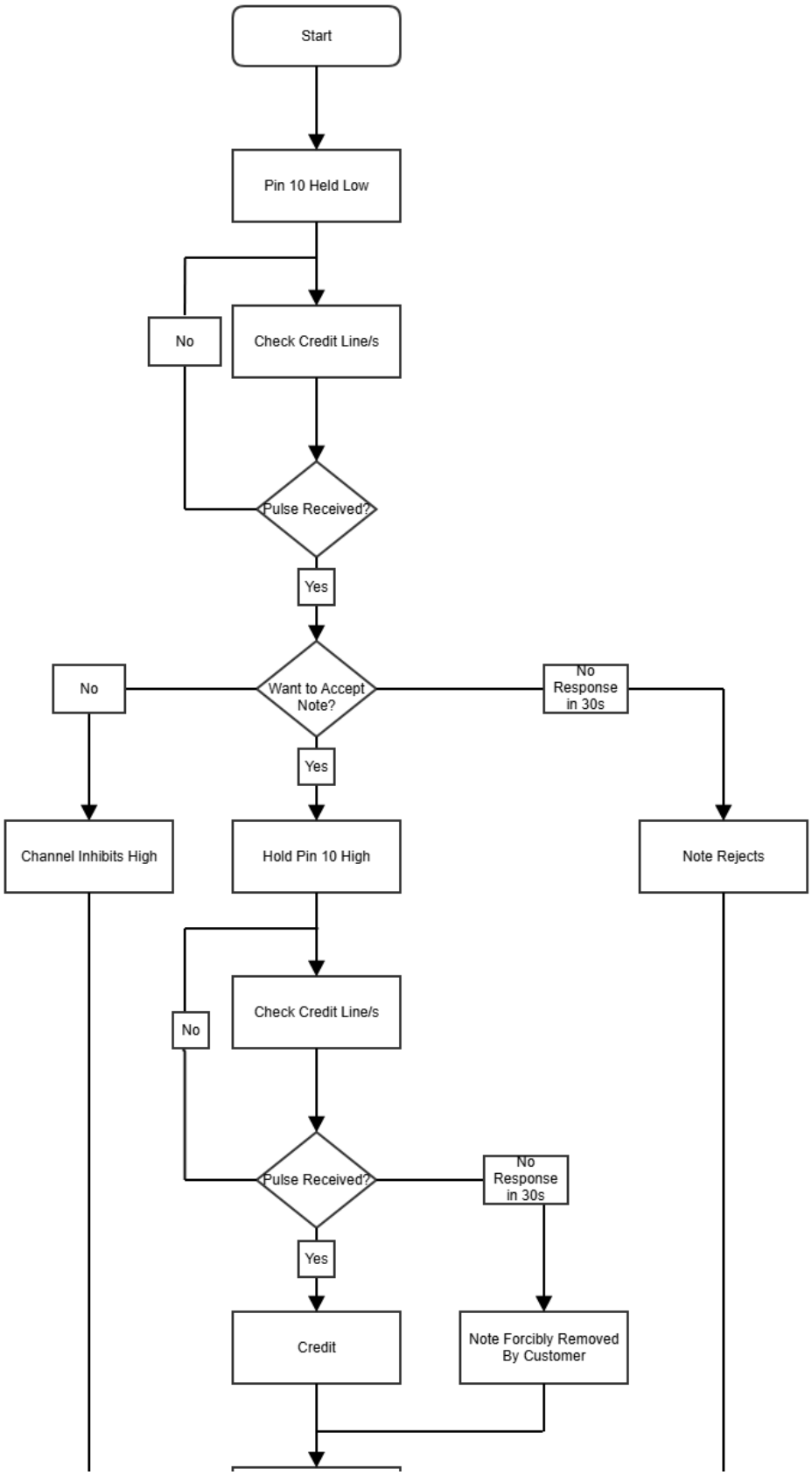
1	Disconnect the power from the BV50	

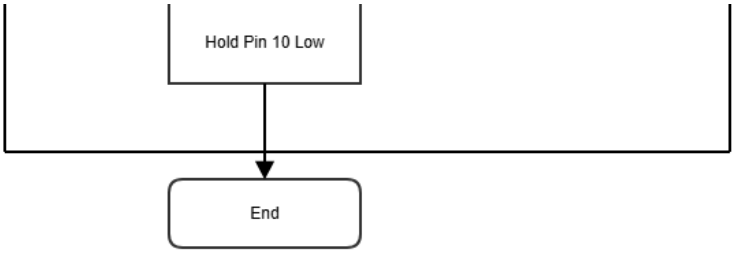
2	Open the head of the BV50 and swing open	

3	Reconnect the cable to the BV50 and hold down the button for over 3 seconds - this is just above the main power connector. When the button is released the bezel LED will flash at a constant rate.	
4	The BV50 is now in trusted mode for 30 seconds. Once the keys are negotiated with the host, disconnect the BV50 validator from the cable, close the head, and re-connect. Plug the validator back in to the host and your validator should now be installed and configured.	

Escrow Control

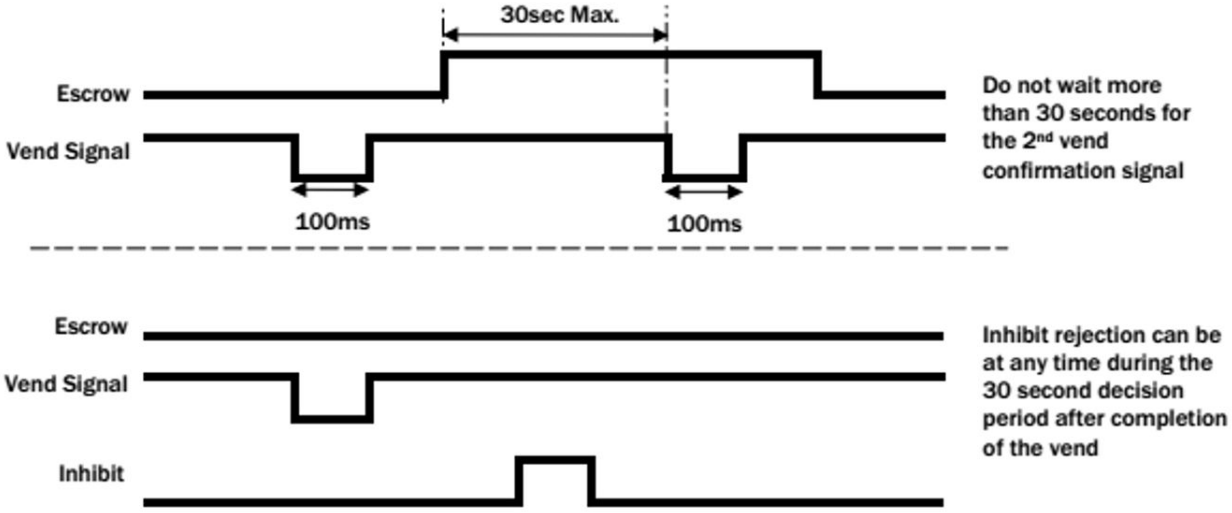
The BV50 has a single note escrow facility. This allows the BV50 to hold onto the note once validated, and then only stack the note into a cashbox when the host machine confirms that the Vend operation has been completed. If no confirmation of the Vend is received, then the note will be returned to the user after 30 seconds. If the host machine itself aborts the transaction by setting the corresponding inhibit input high, the note is returned immediately. The sequence of operation is as follows:





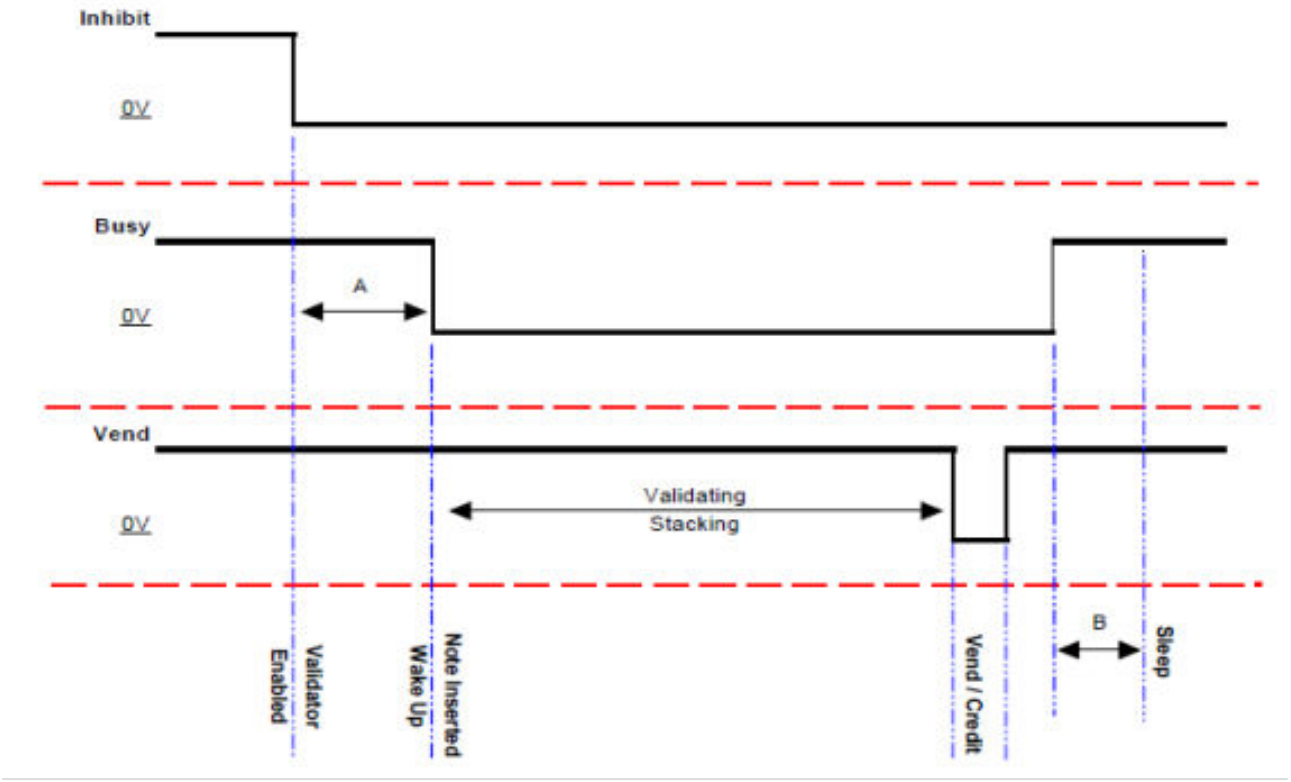
Only book the credit on the second vend pulse!

Escrow Timing Diagram

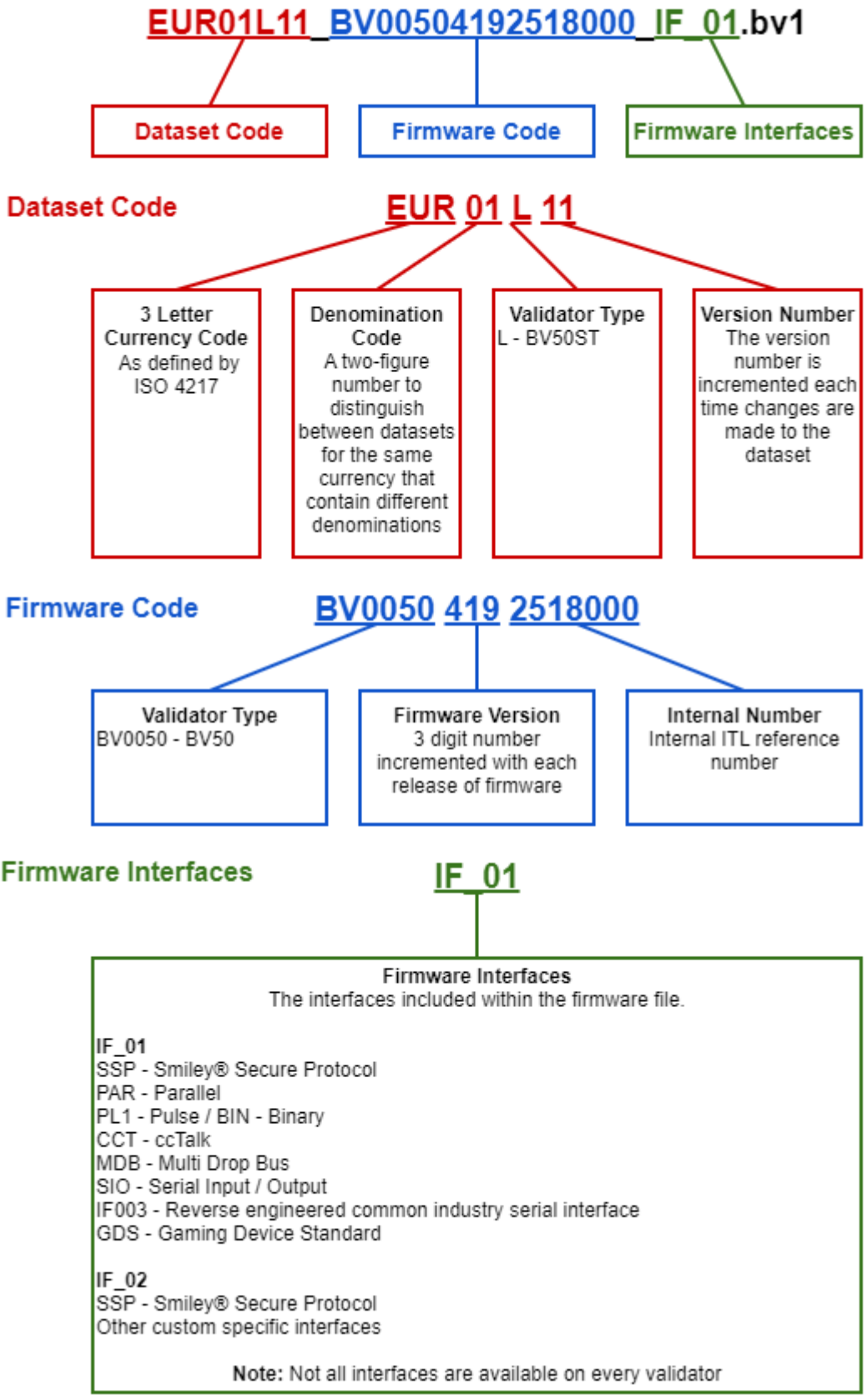


Low Power Mode Timing Diagram

Low Power mode uses 3 control lines: Vend – Pin 1, Inhibit – Pin 5 and Busy – Pin 9



File Naming Convention



BV50 Disclaimer and Safety Information

Contents

Disclaimer

Innovative Technology:

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The contents of this manual set may be subject to change without prior notice.

Product Safety Information

Throughout this user manual, attention should be drawn to key safety points when using or maintaining the product.

These safety points will be highlighted in a box:

This is an example text.

This user manual and the information it contains is only applicable to the model stated on the front cover and must not be used with any other model.

⚠ **Danger!**	**IR and UV Radiation**
 	• Possible skin or eye damage due to presence of IR and UV radiation internally. Disconnect power before servicing • Use PPE measures • Follow safety precautions given in IEC 62471